

SHARING THE ROAD: POLICY IMPLICATIONS OF
ELECTRIC AND CONVENTIONAL VEHICLES IN
THE YEARS AHEAD

HEARING
BEFORE THE
SUBCOMMITTEE ON ENVIRONMENT
OF THE
COMMITTEE ON ENERGY AND
COMMERCE
HOUSE OF REPRESENTATIVES
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SHARING THE ROAD: POLICY IMPLICATIONS OF ELECTRIC AND CONVENTIONAL VEHICLES IN THE YEARS AHEAD

TUESDAY, MAY 8, 2018

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENVIRONMENT,
COMMITTEE ON ENERGY AND COMMERCE
Washington, DC.

The subcommittee met, pursuant to call, at 10:15 a.m., in room 2322 Rayburn House Office Building, Hon. John Shimkus (chairman of the subcommittee) presiding.

Members present: Representatives Shimkus, Barton, Blackburn, Olson, Johnson, Hudson, Walberg, Carter, Duncan, Tonko, Ruiz, Green, McNerney, Cardenas, Dingell, Matsui, and Pallone (ex officio).

Staff present: Samantha Bopp, Staff Assistant; Daniel Butler, Staff Assistant; Kelly Collins, Staff Assistant; Jerry Couri, Chief Environmental Advisor; Margaret Tucker Fogarty, Staff Assistant; Jordan Haverly, Policy Coordinator, Environment; Ben Lieberman, Senior Counsel, Energy; Milly Lothian, Press Assistant and Digital Coordinator; Mary Martin, Deputy Chief Counsel, Energy & Environment; Drew McDowell, Executive Assistant; Brandon Mooney, Deputy Chief Energy Advisor; Austin Stonebraker, Press Assistant; Priscilla Barbour, Minority Energy Fellow; Jeff Carroll, Minority Staff Director; Jean Fruci, Minority Energy and Environment Policy Advisor; Tiffany Guarascio, Minority Deputy Staff Director and Chief Health Advisor; Caitlin Haberman, Minority Professional Staff Member; Rick Kessler, Minority Senior Advisor and Staff Director, Energy and Environment; and Alexander Ratner, Minority Policy Analyst.

OPENING STATEMENT OF HON. JOHN SHIMKUS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. SHIMKUS. We will call the hearing to order and I will recognize myself 5 minutes for an opening statement.

As most of you know, this is the Environmental Subcommittee's third hearing over the last 2 months dealing with fuels and vehicles. Our first hearing provided an overview of the future of personal transportation and I believe there were two key takeaways, one that the internal combustion engine running on petroleum and plant-based liquid fuels remain the major player in the decades ahead. And two that battery electric vehicles will continue to make inroads in the marketplace.

Our next hearing expanded on that first point specifically that since the internal combustion engine and liquid fuels are going to be around for a while we should consider new ideas for improving them, namely, a high octane fuel standard matched with vehicles whose engines are optimized to run on these fuels. Ideally, a range of higher octane fuel blends could lead to as much if not more ethanol use than under the RFS while giving vehicles significantly improved performance and fuel economy.

Today we focus on the second point, the battery electric vehicles, EVs, are gaining in market share and that the internal combustion engine has significant competition for the first time in a long time. This hearing will delve into the question of what these changes mean for everyone involved in fuels and vehicles and most importantly what they mean for consumers. I thank our diverse panel for being here today and providing a variety of perspectives.

I should add that we are focusing on EVs and not other alternative vehicles like natural gas vehicles or fuel cells for example, mainly because projections from the Energy Information Administration see EVs as the fastest growing alternative. Of course, only time will tell which vehicle types will catch on.

When we think of larger EV fleets, one of the first questions that comes to mind is where all the extra electricity is going to come from to power them. After all, EVs are not going to be a good deal for consumers if the electricity is expensive. I am certain we will hear from several witnesses on this point, but I would like to add that I believe coal-fired generation will have an important role in providing affordable electricity and making an EV future work.

Fueling infrastructure is also an issue. We currently have 150,000 liquid fuel retailers along our nation's roads and highways and you can fill up in about 5 minutes. It is hard for EVs to compete with that level of convenience, so charging infrastructure and charging times are still a challenge. As the Nation's vehicle mix changes, we may need to re-think past fuel and vehicle policies. For example, the Renewable Fuel Standard was last amended back in 2007 when we assumed that gasoline demand was on a one-way trip higher. We know now that those assumptions were overstated and will be even more so if EVs continue to gain market share. This doesn't necessarily mean the RFS needs to be amended in light of EVs, but Congress should at least look at the matter.

Automobiles are the second biggest family expense after home so the stakes are high. I look forward to a thorough discussion and again I thank our witnesses.

I have some time. I will yield to the gentlelady from Tennessee.
[The prepared statement of Mr. Shimkus follows:]

PREPARED STATEMENT OF HON. JOHN SHIMKUS

As most of you know, this is the Environment Subcommittee's third hearing over the last two months dealing with fuels and vehicles. Our first hearing provided an overview of the future of personal transportation, and I believe there were two key takeaways—one, that the internal combustion engine running on petroleum and plant-based liquid fuels will remain the major player in the decades ahead, and—two, that battery electric vehicles will continue to make inroads in the marketplace.

Our next hearing expanded on the first point, specifically that since the internal combustion engine and liquid fuels are going to be around for a while, we should consider new ideas for improving them, namely a High-Octane Fuel Standard

matched with vehicles whose engines are optimized to run on these fuels. Ideally, a range of higher-octane fuel blends could lead to as much, if not more ethanol use than under the RFS, while giving vehicles significantly improved performance and fuel economy.

Today, we focus on the second point, that battery electric vehicles (EVs) are gaining in market share, and that the internal combustion engine has significant competition for the first-time in a long-time. This hearing will delve into the question of what these changes mean for everyone involved in fuels and vehicles, and most importantly what they mean for consumers. I thank our diverse panel for being here today and providing a variety of perspectives.

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Fueling infrastructure is also an issue. We currently have 150,000 liquid fuel retailers along our nation's roads and highways, and you can fill up in about 5 minutes. It is hard for EVs to compete with that level of convenience, so charging infrastructure and charging times are still a challenge.

As the Nation's vehicle mix changes, we may need to rethink past fuel and vehicle policies. For example, the Renewable Fuel Standard was last amended back in 2007 when we assumed that gasoline demand was on a one-way trip higher. We now know that those assumptions were overstated and will be even more so if EVs continue to gain market share. This doesn't necessarily mean the RFS needs to be amended in light of EVs, but Congress should at least look at the matter.

Automobiles are the second biggest family expense after a home, so the stakes are high. I look forward to a thorough discussion, and again thank our witnesses.

Mrs. BLACKBURN. Thank you, Mr. Chairman, and thank you to the witnesses for being here and for this hearing. In my district in Tennessee we have Nissan which is located right in Franklin, we have GM at the Spring Hill facility working on the Ecotec engine, and we hear from automakers and auto dealers about EVs. We are interested in looking at going forward on the strength of that battery, and the chairman has well laid out some of the questions that we as a committee have.

We also are looking at the acceptance by the public. Last year in my district, in 2016, 67 percent of the cars that were sold were in the truck category. They were small trucks, light trucks, SUVs, crossovers. And looking at acceptance and then looking at how the EVs will move into that market that is where I will center my questions with you today. I look forward to hearing what you all have to say about this. And as always with us in Tennessee this is an interesting topic and we welcome you. I yield back.

Mr. SHIMKUS. The gentlelady yields back to me. Anyone else seeking the last 30 seconds, if not, I yield back my time and I recognize the ranking member, my friend Mr. Tonko from New York, for 5 minutes.

OPENING STATEMENT OF HON. PAUL TONKO, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Mr. TONKO. Thank you, Mr. Chairman. Before we start the clock, if I might I want to acknowledge the presence of Albany County Executive Dan McCoy who just joined us. It is great to have you in town, Dan, and thank you for your work on transportation issues.

Thank you, Mr. Chair. And thank you to our witnesses for joining us this morning. Much like this subcommittee's future of transportation fuels and vehicles hearing in March, the assembled panel represents a good overview with diverse perspectives on today's issue, the current state and future of electric vehicles. In recent years, despite more options for fuels and improvements in fuel economy, transportation has become the leading source of greenhouse gas emissions in the United States.

Greenhouse gas reductions are occurring much more quickly in the power sector. It has become clear that shifting transportation emissions into electricity generation is not only an effective, but a necessary means for our country to make major strides to address climate change. EVs will continue to become cleaner as the Nation's electricity supply moves toward a more low and more zero emissions energy resources. This has already been recognized by countries around the world, so it is my belief that electric vehicles are not only essential they are inevitable.

But we do not need to look as far as China or Europe to see the desire to promote EVs. Cities and towns across our country are launching smart community projects, many including EV charging sites to make their communities more connected and efficient. I expect we will hear about the benefits of EVs, chief among them the opportunities to improve air quality, reduce gas emissions, and save consumers from fuel costs.

Despite these benefits, it is important to acknowledge that the internal combustion engine is not going to disappear overnight. In the subcommittee's previous hearing we heard estimates of how long it might take for the Nation's vehicle fleet to turn over. Even with a growing adoption rate of EVs, conventional vehicles will remain a staple of our vehicle fleet for decades to come.

Today we should hear about a few aspects of the future of electric vehicles. First, what is the state of EV technology development? In part due to investments by the Department of Energy in recent years, batteries' costs have declined and their effectiveness have improved dramatically. According to DOE's 2016 Revolution Now report, the cost of EV batteries produced at high volume decreased by 73 percent between 2009 and 2016. Automakers are now offering many more vehicle options with ever-increasing ranges at a variety of price points. Continued Federal investments in R&D could unlock the next big breakthrough in fast-charging battery capabilities or vehicle-to-grid smart technologies.

Second, what barriers still exist to broader EV adoption? These may include increasing consumer education and acceptance, deploying new charging infrastructure, and addressing regulatory hurdles. Regulatory action often lags behind technology. This has been true of charging infrastructure which is outstanding questions about where to build it, who can own it, and how to ensure broad public access at affordable rates. Some of these questions will be determined by state governments and PUCs such as the development of off-peak charging rate structures. But clearly there are things Congress can do to incentivize EV purchases and infrastructure build-out.

Finally, where are we heading? The trends are positive for greater EV adoption. I want to highlight a portion of Ms. McKernan's

testimony, and I apologize for spoiling it, but what A-A-A, AAA, has identified is worth mentioning more than once. Between 2017 and '18 there were pretty significant shifts in an increasing number of Americans that want to buy electric for their next vehicle and a decreasing number of Americans concerned about access to charging locations which is still the biggest concern for buyers. It is clear that even in a short amount of time, consumer acceptance is growing and range anxiety is beginning to decline. My guess based on the trends is that concerns over range, charge time, and price will continue to decline especially as more infrastructure is built to support the growing EV fleet.

Perhaps the most important trend which is outside of Congress's control is that many other countries have already set ambitious EV goals. Some are even proposing to ban internal combustion engines entirely in the decades ahead. EVs will be heavily utilized around the world which is why I believe this transition is inevitable. It is my hope that our Federal R&D investment continue to support the research, design, and manufacture of EVs here in the U.S. in the face of increasing global competition and market opportunities.

Mr. Chair, I believe that cleaning up our transportation sector is important regardless of our vehicle and fuel mixes. That means improving fuel economy, developing new low emissions liquid fuels such as advanced cellulosic biofuels, and deploying a much greater number of electric vehicles. If we continue to identify and address barriers, I am certain EV adoption will increase substantially.

So I look forward to hearing more about the current state of EVs as well as what Federal, state, and local policymakers can do to continue to incentivize adoption to ensure that the trend of greater EV deployment continues. With that I thank you, Mr. Chair, and I yield back.

Mr. SHIMKUS. The gentleman yields back his time and the chair thanks the gentleman. The chair now recognizes the ranking member of the full committee, Congressman Pallone from New Jersey, for 5 minutes.

OPENING STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. Thank you, Mr. Chairman. I am pleased that we are finally having a hearing to discuss electric vehicles or EVs. These vehicles are transforming our transportation sector to the benefit of both consumers and our environment, and I strongly support efforts to advance electric vehicles whether they be tax credits for EV purchases, assistance for the deployment of EV charging infrastructure, and Federal investment in vehicle and battery research.

Unfortunately though, progress in transportation modernization and fuel economy is under direct attack by the Trump administration. Recent reports indicate that the administration plans to undermine the 2012 agreement made between the auto industry, the State of California, advocates, and the Obama administration to increase the efficiency of our transportation fleet.

And this is extremely shortsighted and now comes word that President Trump intends to preempt California, a move that ap-

pears driven mainly by Administrator Pruitt and right-wing ideologues to benefit their favorite special interest, the petroleum industry. At the same time, the administration is indiscriminately giving companies of all sizes waivers of the Renewable Fuel Standard undermining that program as well.

So the administration's efforts to gut enhanced fuel economy standards couldn't come at a worse time. Emissions in the transportation sector are continuing to grow. They now exceed those of the electricity sector. In 2017, the cost of weather related disasters hit a record \$306 billion, and just last month we hit another grim milestone. Scientists recorded concentrations of heat-trapping carbon pollution in the atmosphere above 410 parts per million for an entire month. The last time carbon dioxide concentrations were at that level was 3 million years ago when seas were 66 feet higher and human beings did not exist.

So we can't continue down this road. To avoid further catastrophic climate impacts we must use every tool available to reduce greenhouse gases. EVs are one of our most critical tools to do this. In the face of a drastically changing climate we can't afford to move backward on vehicle electrification. I believe the future for electric vehicles is promising and their lower operating and maintenance costs offer significant benefits to American consumers.

As technologies improve and costs continue to climb, consumers will continue to demand cars that save money and help preserve a livable planet for future generations. EVs have been sharing the road for some time now with conventional vehicles. As with any transformative technology, there are still various to widespread EV adoption, some of those are technological, other barriers are created by shortsighted entities who have a financial stake in the status quo and little stomach to push forward the electric platform that most auto companies' CEOs admit is critical for the future of their industry.

And the growth of the EV market even in the face of scant advertising and limited availability is a testament to American innovation and consumers' desire for these vehicles. Continued investment in EVs and charging infrastructure can only yield positive benefits for our environment, the transportation industry, and the American people. So we need smarter energy infrastructure and cleaner vehicles. Many cities across the country are taking the lead, and it is time that we do that at the Federal level to support these efforts. I would like to yield the remainder of my time to Congresswoman Dingell.

Mrs. DINGELL. Thank you, Ranking Member Pallone. We have all been paying attention to the discussion about fuel economy standards and it is clear that electric vehicles are an important part of getting there. The fact of the matter is auto companies are building EVs, but we need to figure out how we are going to encourage more consumers to buy them and that is a challenge we all have to tackle together. We need to use this hearing to understand the barriers to EV adoption and deployment, how we combat range anxiety, and we build out an infrastructure that we need to support electric vehicles.

This closely relates to fuel economy standards and I will talk about this more on my questioning, but want to close with a final

comment. We must maintain one national program for fuel economy standards that keeps California at the table. We need stringent standards that improve over time but that also reflect current marketplace realities like the low cost of gas and low rate of EV adoption.

We are entering a critical phase. We can either come together on a negotiated solution that continues upward progress and sets standards through 2030, or we can have a costly legal battle where nobody will win and we cede American leadership in this area to overseas. I hope that this administration, California, and other stakeholders will roll up their sleeves and get to work on a negotiated deal on fuel economy. Failure is simply not an option, it hurts too many people. I yield back the balance of my time.

Mr. SHIMKUS. And the gentleman yields back his time.

The chair wants to thank you all for joining us today. It is a diverse and a very interesting panel. And so we will start, first of all, and remember your full statements have been submitted for the record, you will have 5 minutes to kind of summarize that and we will go into a question and answer period.

So we will begin with Megan McKernan, Manager, Automotive Engineering, Automobile Club of Southern California, on behalf of AAA. Welcome, you are recognized for 5 minutes.

STATEMENTS OF MEGAN MCKERNAN, MANAGER, AUTOMOTIVE ENGINEERING, AUTOMOBILE CLUB OF SOUTHERN CALIFORNIA, ON BEHALF OF AAA; MITCH BAINWOL, PRESIDENT AND CEO, ALLIANCE OF AUTOMOBILE MANUFACTURERS; GENEVIEVE CULLEN, PRESIDENT, ELECTRIC DRIVE TRANSPORTATION ASSOCIATION; BOB DINNEEN, PRESIDENT AND CEO, RENEWABLE FUELS ASSOCIATION; GEISHA WILLIAMS, PRESIDENT AND CEO, PACIFIC GAS AND ELECTRIC COMPANY, ON BEHALF OF THE EDISON ELECTRIC INSTITUTE; FRANK MACCHIAROLA, GROUP DIRECTOR, DOWNSTREAM AND INDUSTRY OPERATIONS, AMERICAN PETROLEUM INSTITUTE; DAVID REICHMUTH, SENIOR ENGINEER, CLEAN VEHICLES PROGRAM, UNION OF CONCERNED SCIENTISTS; AND, DYLAN REMLEY, SENIOR VICE PRESIDENT, GLOBAL PARTNERS LP, ON BEHALF OF THE NATIONAL ASSOCIATION OF CONVENIENCE STORES AND SOCIETY OF INDEPENDENT GASOLINE MARKETERS OF AMERICA.

STATEMENT OF MEGAN MCKERNAN

Ms. MCKERNAN. Chairman Shimkus, Ranking Member Tonko, and members of the subcommittee, thank you for the opportunity to testify at today's hearing. My name is Megan McKernan and I am the Manager of Automotive Engineering for the Automobile Club of Southern California. In that role I lead the team of automotive engineers responsible for evaluating alternative fuel vehicles for our annual Green Car Guide. I am also a race car driver, so I am one of those lucky people that gets to apply my passion for cars with my job.

With over 100 years of experience, AAA is a trusted, independent authority in the automotive industry. AAA experts serve on SAE committees responsible for setting automotive standards and participate in the Auto-ISAC working group responsible for vehicle cy-

bersecurity guidelines. Most importantly, AAA serves 58 million members and is a leading traffic safety advocate. In the time I have today I would like to focus on a few key points from the more detailed testimony submitted for the record.

AAA has invested significant resources into understanding and evaluating vehicle ownership trends, fuels, automated vehicle technologies and electric vehicles, and surveying consumer trends. One of the key investments we have made in this area is the Automobile Club of Southern California's Automotive Research Center, ARC, located in Los Angeles, a premier vehicle emission test laboratory featuring state-of-the-art facilities and equipment operated by a team of highly qualified engineers and technicians.

The pace of battery EVs and plug-in hybrid vehicles being introduced into the national fleet is likely to accelerate especially as technology trends ramp up due to changing consumer preferences, lower ownership costs, and the adoption of connected and autonomous vehicles. In fact, according to a new AAA survey, 20 percent or 50 million Americans are likely to go electric for their next vehicle purchase, a jump of five percentage points from just a year ago.

Since 2010, the AAA Green Car Guide has become a trusted source of information for buyers who are looking to maximize the value of their purchase. A team of ARC engineers with more than 75 years of combined automotive experience conduct the evaluations of a variety of new alternative vehicles including hybrid or plug-in hybrid, battery electric, compressed natural gas, hydrogen, other alternative fuel vehicles, or have category leading fuel economy set by the U.S. EPA for the annual AAA Green Car Guide.

All vehicles are evaluated in thirteen different categories in real-world and test track evaluations using testing procedures developed by SAE standards and custom procedures employed by the ARC to provide useful information to members and consumers. Vehicles are rated on the criteria that matter most to car buyers including ride quality, safety, and performance. In 2018, we evaluated 74 vehicles and based on our findings awarded AAA's Top Green Vehicle awards in several categories. The complete guide has also been submitted for the official record and is available online for consumers.

To better understand what the public thinks about EVs, AAA also conducted a consumer attitude survey on EV purchasing trends. So what did we find? Two in ten Americans say they are likely to buy an electric vehicle the next time they are in the market for a new or used vehicle, an increase from 15 percent over 2017 survey results. We also learned concern for the environment is the top reason consumers are likely to purchase an EV, followed closely by lower long-term ownership costs, access to the newest technologies, and then access to car pool lanes.

And range anxiety, previously a serious concern for consumers, is beginning to ease. More charging options is reducing consumer anxiety and making EVs an attractive vehicle purchase and viable transportation option for a variety of trips, including longer journeys that may require fueling options as convenient as filling up at the local gas station. With more consumers looking to purchase an EV, the AAA Green Car Guide is a valuable resource for con-

sumers who are looking for the right electric vehicle or alternative fuel vehicle for their next purchase.

Over the coming years, automakers will make EVs a higher priority in their research and development efforts and the next generation of EVs will feature the most advanced technology our nation's roads have ever seen. Whether it is EV or autonomous vehicle, the importance of well-maintained roads and bridges cannot be ignored. Infrastructure improvements and system upgrades will need to incorporate electric vehicle charging, intelligent transportation, and connected vehicle technologies to ensure networks are built and maintained to support all levels of connectivity that will benefit users and improve safety.

In closing, AAA is committed to doing its part to provide accurate information to help consumers on all things automotive. Through our continued vehicle research and consumer surveys to our work in traffic safety, we will look for opportunities to make the Nation's roads, vehicles, and drivers safer. Thank you.

[The prepared statement of Ms. McKernan follows:]



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**Written Testimony of Megan McKernan
Manager, Automotive Engineering Automotive Research Center
Automobile Club of Southern California
Before the U.S. House of Representatives Energy and Commerce Committee, Subcommittee on
Environment**

May 8, 2018

On behalf of AAA, I would like to thank you for the opportunity to express our views on consumer attitudes related to electric vehicles (EVs). As a vocal consumer advocate, AAA has invested significant resources into understanding and evaluating vehicle ownership trends, fuels, automated vehicle technologies and electric vehicles. This effort includes fostering relationships with automakers, surveying consumer attitudes and purchase intentions, conducting cutting-edge research, and testing of the latest automotive technologies.

One of the key investments we have made in this area is the Automobile Club of Southern California's Automotive Research Center (ARC), which is located in Los Angeles. The ARC has a premier vehicle emission test laboratory featuring state-of-the-art facilities and equipment operated by a team of highly qualified engineers and technicians, who I have had the privilege to lead over the last five years.

With over 100 years of experience, AAA is a trusted, independent authority in the automotive industry. AAA experts serve on Society of Automotive Engineers (SAE) committees responsible for setting automotive standards and participate in the Automotive Information Sharing and Analysis

Center (Auto-ISAC) working group responsible for vehicle cybersecurity guidelines. Most importantly, AAA serves 58 million members and is a leading traffic safety advocate.

AAA commends the Subcommittee on its thoughtful and deliberative approach to studying the policy implications of EVs becoming more prevalent on the nation's roads. The internal combustion engine – running on liquid fuels – is likely to remain the most dominant propulsion technology for consumers in the coming decades. However, the pace of battery EVs and plug-in hybrid vehicles being introduced into the national fleet is likely to accelerate, especially as technology trends ramp up due to changing consumer preferences and the adoption of connected and autonomous vehicles. Moreover, as charging infrastructure expands throughout the country and ownership costs lower, more and more consumers are deciding to switchover to vehicles that use electricity as their primary fuel source. Today's hearing comes at an optimal time given how quickly transportation technology is evolving and electric vehicles growing visibility among all road users. In 2017, electrified vehicles accounted for 3.3% of U.S. vehicle sales. This is up from 2015 and 2016.

AAA is actively working to help make sense of all of this innovation for our members and consumers, providing useful advice on technology adoption trends for both consumers and policymakers.

Background

American drivers have a growing appetite for EVs. According to a new AAA survey, 20 percent of Americans (50 million) are likely to go electric for their next vehicle purchase – a jump of 5 percentage points from just a year ago. With lower-than-average ownership costs, increased driving

ranges and the latest advanced safety features, more consumers than ever are interested in EVs. Moreover, concern for the environment is still a top reason 80 percent of Americans who are considering an EV may make the leap next time they are in the market for a new vehicle.

These trends are in line with global movement toward EVs in the industry, where China – for example – saw 2017 sales figures for EVs reach four times those found in the U.S. market. In the last two years, several countries and major automotive markets poised for growth, including China, India, Japan and South Korea, have set ambitious goals for EV proliferation throughout their respective national fleets. In Europe EVs represented approximately 5% of vehicle sales. Additionally, some policymakers around the globe have started efforts to ban consumers from purchasing diesel and gasoline-powered vehicles in the future decades, or offer increasingly enticing incentive plans aimed at luring consumers away from the internal combustion engine. Automakers are taking note of these trends and are aligning their own investment and research timelines to match the new contours of the evolving automotive industry. It is estimated that automakers will invest more than \$90 billion in vehicle electrification to remain competitive in the global EV market.

Green Car Guide

As potential EV buyers look at all of the vehicle options on the market, including electric vehicles and alternative fuel vehicles, AAA has undertaken independent, rigorous test-track evaluations of plug-in hybrids, hybrid and fuel-efficient, gas-powered vehicles to help consumers understand current models. Since 2010, the annual AAA Green Car Guide has become a trusted source of information for buyers who are looking to maximize the value of their purchase.

The rigorous research and evaluations are conducted by the Automobile Club of Southern California's Automotive Research Center (ARC), which rates and ranks new vehicles and publishes the annual AAA Green Car Guide. To be eligible for AAA Green Car Guide evaluations, which are conducted by AAA's ARC engineers and technicians who have more than 75 years of combined automotive experience, vehicles must be a hybrid or plug-in hybrid, battery electric, compressed natural gas (CNG), hydrogen, other alternative fuel vehicle or have category-leading fuel economy set by the U.S. Environmental Protection Agency (EPA). All vehicles are evaluated in 13 different categories in real-world and test track evaluations that include acceleration, handling, ride comfort and other important factors. The driving tests were performed at the Auto Club Speedway in Fontana, California and on southern California roads. Testing procedures were developed using the Society of Automotive Engineers (SAE) standards and custom procedure employed by the ARC to provide useful information to members and consumers.

Vehicles are rated on the criteria that matter most to car buyers, including ride quality, safety and performance. In 2018, we evaluated 74 vehicles and we awarded top vehicles, based on our findings, AAA's Top Green Vehicle Awards in several categories, including best midsize car and best value for \$30,000 - \$50,000. The guide also provides a listing of top cars for teens. A complete list of the award recipients is available in the report, and available online for consumers.

Additionally, to support EV drivers, AAA tracks charging station availability via the AAA Mobile app and TripTik Travel Planner as a service that provides useful data drivers need to plan trips. AAA has also piloted mobile EV charging in several markets, and while usage of this service is very low,

the learning will help prepare us for the future when EVs make up a larger percentage on the vehicles on the road.

EV Consumer Survey

As the domestic EV market heats up, Americans are greeted with more choices than ever when purchasing a vehicle. To better understand changing consumer preferences, AAA conducted a telephone omnibus survey in March 2018 with over 1,000 adults 18 years of age or older to gauge consumer attitudes toward electric vehicles. A similar study in 2017 provided insight into how consumers' thinking has evolved toward the technology.

To understand consumer attitudes toward electric vehicles, AAA pursued three lines of inquiry for its 2018 survey. First, we sought to investigate how many Americans are interested in buying an electric or hybrid vehicle. Next, we wanted to uncover the motivations for Americans to purchase an electric vehicle. Additionally, we thought it would be critical to understand what prevents Americans from purchasing an electric vehicle and how convenient it is to charge an electric vehicle, which can be a crucial consideration for American EV buyers.

Our findings from the 2018 survey revealed the following:

- Two-in-ten (20%) Americans say they are likely to buy an electric vehicle the next time they are in the market for a new or used vehicle, an increase from 15 percent over 2017's survey results.

- Consumers who are likely to buy an electric vehicle would do so out of concern for the environment (80%), lower long-term ownership costs (67%), cutting edge technology (54%) and access to the car pool lane (35%).
- Reliability and fuel economy/range are the most important criteria for consumers when choosing which hybrid or electric vehicle to buy.
- Nine-in-ten (92%) Americans who are likely to buy an electric or hybrid vehicle, consider reliability important, followed by fuel economy or how far the vehicle can go on one charge (87%).
- Other considerations include crash rating (77%), cost (71%), vehicle performance (69%) advanced safety technology such as automatic emergency braking and lane keeping assistance (60%).
- Six-in-ten Americans (63%) who are unlikely (or unsure) to purchase an electric vehicle are concerned there are not enough places to charge. This, however, is down from 69 percent in 2017.
- Compared to last year, drivers are less concerned about traditional EV purchase barriers, including charging availability and battery life:
 - Running out of charge while driving (58% in 2018 versus 68% in 2017) and higher cost to repair or replace the battery (49% in 2018 versus 55% in 2017).
 - Baby Boomers (66%) and Generation X (64%) are more likely than Millennials (48%) to be concerned about running out of charge while driving.

Consumer expectation regarding the amount of time they would be willing to wait to charge their vehicle while on the road may not align with reality. Seven-in-ten Americans (68%) feel that a

charging time of no more than 30 minutes is reasonable, when in fact, if a higher voltage charger is available, it can take several hours to charge a fully depleted battery. A standard 120-volt outlet available in most homes will recharge most electric vehicles overnight, especially for those EVs with a smaller battery.

Conclusion

Today, electric vehicles are gaining mainstream appeal. Perhaps fueling American's desire for electric vehicles, AAA's survey found that "range anxiety" is beginning to ease. More charging options will reduce consumer anxiety and position EVs as a viable transportation option for a variety of trips, including longer journeys that may require fueling options as convenient as filling up at the corner gas station. Moreover, while range is important to most (87 percent) electric and hybrid vehicle shoppers, it is not the only consideration. Reliability is king with nine-in-ten (92 percent) of those likely to buy an electric or hybrid vehicle stating it is important when evaluating which car to buy. The AAA Green Car Guide is a valuable resource for members as well as for all consumers who are looking for the right electric vehicle or alternative fuel vehicle for their next purchase. That is why the Automobile Club of Southern California's Automotive Research Center has taken great pride in publishing the guide over the last decade.

Our survey findings illustrate that overall technological advancements in new vehicles are helping to push drivers into EVs, as advancements in fuel technologies are viewed as one of the options among the many that drivers want in their next vehicle.

More Americans than ever before are considering EVs when they purchase a new vehicle. As demand for EVs heats up, automakers are taking note – especially as the global market grows and governments around the world take action to put their citizens behind the wheel of an EV. Over the coming years, automakers will make EVs a higher priority in their research and development efforts, and the next generation of EVs will feature the most advanced technology our nation's roads have ever seen. It is likely that EVs will form the platform upon which autonomous vehicles are deployed. Additional research, investment and deployment of next generation EVs will be needed to address consumer concerns that enhance the total capabilities of the vehicle.

With electric vehicles serving as the platform for delivering more advanced technologies for consumers, infrastructure improvements and system upgrades will need to incorporate electric vehicle charging, intelligent transportation and connected vehicle technologies to ensure networks are built and maintained to support all levels of multi-modal connectivity that will benefit all users and improve safety.

As noted earlier, AAA is celebrating over 100 years as an association tracking all the developments and advancement of the automobile from its very beginning. As a researcher, it is exciting to be part of the automotive transformation that will ultimately lead to more fuel efficient and safer cars for all drivers. Our surveys show that Americans' interest in electric vehicles is growing, and will likely increase over time. Concerns associated with range anxiety, reliability and ownership costs are being replaced with consumer confidence in electric vehicles. Our Green Car Guide provides options for consumers that are poised to replace or purchase their first electric or alternative fuel vehicle.

AAA is committed to doing its part to provide accurate information to help consumers on all things automotive. Through our continued vehicle research and consumer surveys to our work in traffic safety, we will look for our opportunities to make the nation's roads, vehicles and drivers safer.

As a vocal consumer advocate, AAA has invested significant resources into understanding and evaluating vehicle ownership trends, fuels, automated vehicle technologies and electric vehicles. This effort includes fostering relationships with automakers, surveying consumer attitudes and purchase intentions, conducting cutting-edge research, and testing of the latest automotive technologies.

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MAY 2018

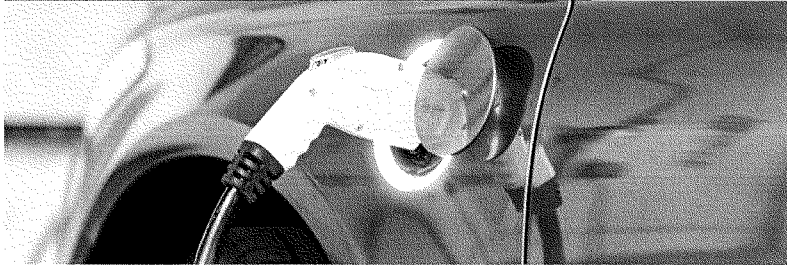
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FACT SHEET

CONSUMER ATTITUDES ELECTRIC VEHICLES



Automotive
Engineering



BACKGROUND

Thanks to their compatibility with autonomous vehicle technologies and energy efficiency, electric vehicles are emerging as the centerpiece of the future. In 2018, a new AAA survey has found an increased interest in electric vehicles, with 20 percent of Americans (50 million people) saying they are likely to buy one for their next car, up from 15 percent in 2017. Concern for the environment remains the top reason for purchase (80 percent), followed by lower long-term costs (67 percent), cutting edge technology (54 percent) and access to car pool lane (35 percent).

As popularity for electric vehicles grows, automakers will expand the electric vehicle portfolio even more, offering consumers a wide variety of choices. This combined with rising gas prices, easing of range anxiety and the lower long-term costs of ownership leads AAA to believe the future for electric vehicles is fertile and will continue to grow.

KEY FINDINGS

Electric Vehicle Appetite:

- Two-in-ten (20%) Americans say they **are likely to buy an electric vehicle** the next time they are in the market for a new or used vehicle, an increase from 15 percent over 2017.
- Americans who are likely to buy an electric vehicle would do so out of **concern for the environment** (80%), **lower long-term costs** (67%), **cutting edge technology** (54%) and **access to the car pool lane** (35%).
- Women (90%) are more likely to buy an electric vehicle out of concern for the environment over men (68%).

To understand consumer attitudes toward electric vehicles, AAA pursued three lines of inquiry:

1. How many Americans are interested in buying an electric or hybrid vehicle?
2. What is motivating Americans to purchase an electric vehicle?
3. What prevents Americans from purchasing an electric vehicle?
4. How convenient is charging an electric vehicle?



CONSUMER ATTITUDES - ELECTRIC VEHICLES

- Three in 10 adults (31%) say they are **likely to buy a hybrid vehicle** the next time they are in the market for a new or used vehicle. This level of interest is unchanged from 2017.
- Reliability and fuel economy/range are the most important criteria for consumers when choosing which hybrid or electric vehicle to buy.
- Nine-in-ten (92%) Americans who are likely to buy an electric or hybrid vehicle, **consider reliability important**, followed by fuel economy or how far the vehicle can go on one charge (87%).
- Other considerations include crash rating (77%), cost (71%), vehicle performance (69%) advanced safety technology such as automatic emergency braking and lane keeping assistance (60%).

Range Anxiety:

- Six-in-ten Americans (63%) who are unlikely (or unsure) to purchase an electric vehicle are concerned there are **not enough places to charge**. This, however, is down from 69 percent in 2017.
- Drivers are less concerned this year over last regarding the following purchase barriers:
 - **Running out of charge while driving** (58% versus 68%) and **higher cost to repair or replace the battery** (49% versus 55%).
 - Baby Boomers (66%) and Generation X (64%) are more likely than Millennials (48%) to be concerned about running out of charge while driving.

Charging Expectations:

- Consumer expectation regarding the amount of time they would be willing to wait to charge their vehicle while on the road may not align with reality. Seven-in-ten Americans (68%) feel that **a charging time of no more than 30 minutes is reasonable**, when in fact, if a Level 2 charger is available, it can take several hours to charge a fully depleted battery. If a normal 120 volt outlet is all that is available, an overnight charge may be required to get you back on the road.
- Women (44%) are more likely than men (33%) to feel that charging time of no more than 15 minutes would be reasonable.

AAA Green Car Guide

The Automobile Club of Southern California's Automotive Research Center rates and ranks electric, hybrid, compressed natural gas-powered (CNG), diesels and high fuel economy gasoline-powered vehicles for the annual AAA Green Car Guide. Vehicles are rated on the criteria that are most important to car buyers, including ride quality, safety and performance. Visit AAA.com/greencar to learn more information.

In 2018, the following vehicles earned AAA's Top Green Vehicle Award:

CATEGORY	VEHICLE
Overall	Tesla Model X 75D
Subcompact Car	Chevrolet Bolt EV Premier
Compact Car	Nissan Leaf SL
Midsized Car	BMW 530e i-Performance
Large Car	Tesla Model S 75
Pickup	Ford F-150 4X4 XLT Sport
SUV/Minivan	Tesla Model X 75D
Best Under \$30K	Kia Niro LX
Best \$30K - \$50K	Chevrolet Bolt EV Premier
Best Over \$50K	Tesla Model X 75D

METHODOLOGY

A telephone omnibus survey was conducted March 8-11, 2018. A total of 1,003 interviews were completed among adults, 18 years of age or older.

A dual-frame approach was used that combined landline and cell phone interviews to ensure that adults who only or primarily communicate via cell phones are included and properly represented. Survey responses are weighted by six variables (age, gender, geographic region, race/ethnicity, education, and landline vs. cell phone only) to ensure reliable and accurate representation of the total continental US population, 18 years of age and older.

Generation groups defined as: Millennials (20-37 years old), Generation X (38-53 years old) and Baby Boomers (54-72 years old).

The margin of error for the study is 4% at the 95% confidence level. Smaller subgroups will have larger error margins.

Mr. SHIMKUS. Thank you.

Now I would like to recognize Mr. Mitch Bainwol, President and CEO of the Alliance of Automobile Manufacturers. Sir, you are recognized for 5 minutes.

STATEMENT OF MITCH BAINWOL

Mr. BAINWOL. Thank you, Chairman Shimkus and Ranking Member Tonko, members of the committee. I am Mitch Bainwol. I run the Auto Alliance which is comprised of 12 manufacturers headquartered in the U.S., in Europe, and in Japan, and we are responsible for about 80 percent of the vehicles on the road today in this country. Next slide.

[Slides shown.]

Mr. BAINWOL. Rather than read testimony, I am going to run through a short PowerPoint deck and hopefully it will be a little lively and at least some good images here for you.

The first slide shows world vehicle sales 1996, 2006, and 2016 by region, and what you see is one phenomenal growth in sales. So mobility is alive and well and we are probably, 2017, closer to a hundred million units. When you think about the next decade a billion cars will be put on the roads of the world. What you also see is that the U.S. is a very mature market. We are relatively stable in terms of sales. And you see China ramping up, so China is clearly the world leader in terms of unit sales. The question for us really, ultimately, is who will be the world leader when it comes to innovation and we want that to happen here. Next slide.

We are talking today about powertrain. I think when you reflect on the broader question of mobility there are four different trends going on. One is powertrain, another is connectivity, another is the trend toward autonomy which this committee has addressed, thankfully, and the last is sharing, and these are all independent trends but they are interactive. And when you have a conversation about powertrain I think you have to look in the context of the broader question. Next slide.

Around the world, and this was, I think, suggested in Mr. Tonko's statement, we are seeing policy made to either phase out liquid fuel, ban liquid fuel, or set EV targets. So this is happening in a very, very dramatic way. We are global companies and we are having to respond to that global reality when it comes to policy. That is also happening in the U.S., more so in California and what are called ZEV states, states that follow the California model. But we are seeing policy induce electrification, and the question really is how you align what is happening in the marketplace with what is happening with policy. Next slide.

What you see here, very quickly, is a timeline of announcements by the companies responding to the global interest in electrification. Next slide.

You see the green bars show from 2011 through 2017 the number of models available to the public when they go into showrooms to buy a car and it has gone up by about 980 percent from 2011 to 2017. So we are offering many more models but consumers literally are not buying it just yet. EVs represent about 1.2 percent of the marketplace. If you add in hybrids you are getting closer to about 3 percent. The next slide tells you why this is in part happening

and one reason is the success of the conventional engine. From 2005 to 2017, the conventional engine is up 30 percent in terms of fuel economy and so that does make the question in terms of the economic calculus a more complicated one for the consumer. Next slide.

Here you see the relationship between gas prices and the adoption, the purchase of alternative powertrains and it looks like an Olympic event. It looks like synchronized swimming. It is just directly correlated, and so policymakers can make policy but what happens in the marketplace has a huge impact in terms of buying behavior.

The next slide shows the bottom line in terms of where we are and the red line is the share of the marketplace that is gas and diesel. The blue line is the share of the marketplace that is a combined hybrid, plug-in, and electric and the circled percentages are the delta between gas, diesel, and alternative powertrains. And from 2011 to 2017 that net has gone from 96 percent to 95 percent, so in other words it hasn't really moved. We all expect it is going to change at some point, but it has not yet changed.

I have two more slides. This next one is a bit complicated, but I can deconstruct it pretty quickly and easily. It reflects, and I believe you may have a copy of this and we will make sure it is available to you, this reflects the ZEV percentages in 2013 and in 2017 by the states on the Energy and Commerce Committee. So, overall, ZEVs were 0.6 of the marketplace in 2013, in 2017 nearly doubled to 1.13. If you look at California, there you see a material change.

So, for the California members, up from 2.34 to 4.81, California is alone in this respect. Other states are not moving quite as rapidly. It is also important to point out Georgia, where the ZEV credit, the tax credit, was removed and there the number actually fell. So there is a direct relationship between the availability of tax credits and adoption.

Finally, the last slide, I just want to make a point that the job of Congress is hard and sometimes policies conflict. If you care about the environment and that is your driving passion in CO₂ reduction then you are looking to promote electrification and that all makes sense, but that obviously drains the trust fund. If you are looking to build an infrastructure then you want a robust gas fund and that unfortunately is inhibited by electrification and by the improvements in conventional engines.

At any rate, I appreciate the opportunity to testify and this is a kind of sardine panel, but I would look forward to the questions.

[The prepared statement of Mr. Bainwol follows:]



AUTO ALLIANCE
DRIVING INNOVATION™

**STATEMENT
OF THE
ALLIANCE OF AUTOMOBILE MANUFACTURERS**

**BEFORE THE:
ENERGY AND COMMERCE COMMITTEE
SUBCOMMITTEE ON ENVIRONMENT
U.S. HOUSE OF REPRESENTATIVES**

**HEARING TITLE:
“Sharing the Road: Policy
Implications of Electric and Conventional Vehicles in the Years Ahead”**

May 8, 2018

PRESENTED BY:

Mitch Bainwol
President and CEO

Introduction

On behalf of the 12 members of the Alliance of Automobile Manufacturers (Alliance), thank you for the opportunity to testify today on the policy implications of electric and conventional vehicles sharing the roads of the future. The Alliance is the leading advocacy group for the auto industry representing over 70 percent of new car and light trucks sales in the United States. The Alliance's diverse membership includes companies headquartered in the U.S., Europe and Asia -- the BMW Group, FCA US, Ford Motor Company, General Motors Company, Jaguar Land Rover, Mazda, Mercedes-Benz USA, Mitsubishi Motors, Porsche, Toyota, Volkswagen Group of America and Volvo Car Group.

By creating jobs, fueling innovation, building exports and advancing mobility, automakers are driving the American economy forward. Nationwide, more than seven million workers and their families depend on the auto industry. Each year, the industry generates \$500 billion in paychecks, and accounts for \$205 billion in tax revenues across the country. Historically, the auto industry has contributed between 3 - 3.5 percent to America's total gross domestic product. No other single industry is linked to so much of U.S. manufacturing or generates so much retail business and employment.

Automakers Offer Record-Breaking Choices in Fuel-efficient Vehicles Today

The auto industry has invested billions of dollars on powertrain R&D and that investment is paying off – automakers are providing customers with record-breaking choice in fuel-efficient vehicles. Today, more than 490 models are on sale that achieve at least 30 miles per gallon. Electric Vehicles (EVs), in particular, play an important role in achieving our energy and environment goals, both in the U.S. and around the world. It's important to

note that EVs and conventional vehicles share the road today. Frequently, I notice after several minutes of driving, that I have been driving next to an EV for most of my morning commute. Even the terms conventional and electric vehicle can be confusing since most vehicles today now contain some electrification. There is a whole spectrum of electrification from gasoline-powered vehicles with stop/ start, to 48-volt hybrids, full or “strong” hybrids, plug-in hybrids to battery electric and fuel cell electric vehicles. I should note that within the context of this hearing, I use the term “EVs” to capture only vehicles that plug into the wall or use hydrogen for fuel, namely plug-in hybrids, battery electric vehicles and fuel cell electric vehicles. As recently as 2012, there were less than five EV models available for sale. Today, there are 42 models of electric vehicles on sale, including 15 battery electric, 24 plug-in hybrid electric and 3 fuel cell electric models, with more in development. Consumers can now buy EVs of all different shapes and sizes — small cars, large cars, SUVs and minivans, in 2WD or AWD, with shorter and longer ranges, from economy vehicles to luxury models and everything in between. However, despite the record offering of such EV’s, only about one percent of all vehicles purchased last year were plug-in hybrids, battery electric or fuel cell vehicles.

Public Policy Driving Shift Towards Electrification

Despite the small share of the market today, the regulatory environment is undoubtedly pushing industry towards electrification. At the federal level, increasing Corporate Average Fuel Economy (CAFE) and vehicle greenhouse gas (GHG) emission standards will require an increasing shift towards EVs. While many have called into question the viability of the previous MY 2022-2025 vehicle CAFE/GHG standards, studies estimate that nearly every vehicle sold in the U.S. in MY 2025 would need to be a mild hybrid, or

alternatively the fleet will need to consist of greater than 30 percent strong hybrid-electric vehicles for compliance.¹

At the state level, California has unique authority to set standards that require automakers to invest heavily in fuel-efficient, advanced vehicle technologies. For example, Section 177 of the Clean Air Act grants California the ability to obtain a waiver to set their own vehicle emissions standards. Other states have the option to adopt either the federal emission standards or the California standards. Twelve other states have adopted the California emissions standards – representing roughly 40 percent of the U.S. market. Currently, California deems the EPA’s light-duty vehicle GHG program as in compliance with the California GHG standards through model year (MY) 2025 as long as they are “substantially similar.” This “deem to comply” provision enabled what is commonly referred to as “One National Program” – aligning the federal vehicle CAFE and GHG programs with the California GHG emissions program – effectively establishing one set of fuel efficiency standards.

Within the context of the Midterm Evaluation for MY 2022-2025 standards, automakers have urged the Trump Administration to find a solution that continues to: (1) increase fuel efficiency standards year-over-year and (2) incorporate California to ensure that “One National Program” is maintained. Otherwise, automakers may be forced to comply with a bifurcated regulatory system – one for California and the additional 12 states that follow their program and one for the other 37 states. Compounding matters, more states

¹ Pannone, G., Betz, B., Reale, M., and Thomas, J., *Decomposing Fuel Economy and Greenhouse Gas Regulatory Standards in the Energy Conversion Efficiency and Tractive Energy Domain*, SAE INT. J FUELS LUBR. 10(1):2017, doi:10.4271/2017-01-0897

could seek to be added as 177 States. The resulting regulatory nightmare would ultimately harm consumers by increasing vehicle costs and restricting consumer choice. California has an additional vehicle requirement, which nine other states follow and is commonly referred to as the Zero Emissions Vehicle (ZEV) mandate, which requires automakers to not only produce but *sell* ZEVs. By 2025, automakers will be compelled to sell enough ZEVs to reach up to approximately 15 percent of total new vehicles sales in each ZEV state, depending on the range of the ZEV. To give you a perspective of this challenge, ZEV sales currently constitute 5 percent of sales in California but ZEV sales in the other nine states that follow the ZEV mandate only amount to roughly one percent of sales so far in 2018. This is because the other ZEV states (primarily Northeast and Pacific Northwest states) are unlike California in several ways including terrain, weather, a lack of supporting infrastructure and fewer direct and indirect state ZEV incentives to spur consumer adoption.

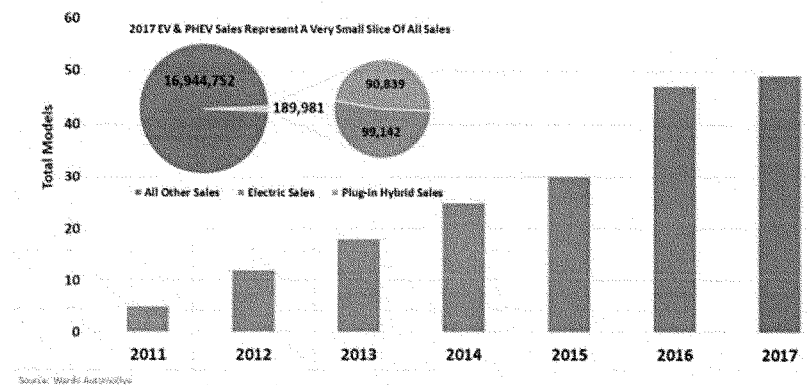
Automakers are also facing a movement globally to adopt electrification targets or ban conventional internal combustion engines all together. At least ten other countries have EV sales targets in place – including China, the world’s largest market for new cars. Countries like France, the United Kingdom and Norway have established timeframes to phase out the sale of new gasoline and diesel-powered vehicles. For example, Norway hopes to have all new passenger cars and vans sold by 2025 be ZEVs and France intends to end the sale of conventional vehicles by 2040. Here in the U.S., California is signaling interest in this trend. In fact, earlier this year, legislation was introduced in the California legislature that would ban gasoline-powered vehicles by 2040 in order to meet the state’s aggressive goals to reduce greenhouse gas emissions.

Vehicle Market and Consumer Adoption is Lagging Behind Policy Requirements

Yet, despite automakers offering record level incentives and choices in EV models, the aforementioned federal and state vehicle emissions requirements and global trends toward electrification, consumer demand for EVs is still significantly lagging.

Consumers are not embracing these alternative powertrains at the levels necessary to meet the aspirational goals of policymakers. Automakers have done extensive market research to learn more about consumers, and have found that consumers like the idea of helping the environment (38 percent) and not paying for gas (29 percent). However, significantly more people say they would buy an EV than actually do. While sales are rising, nationwide new vehicle sales of battery electric and plug-in hybrid electric autos were about 1 percent in 2017. This equates to less than 200,000 vehicles out of 17 million sold.

**Total Electric And Plug-in Hybrid Vehicle Sales And Model Availability:
2011 - 2017**

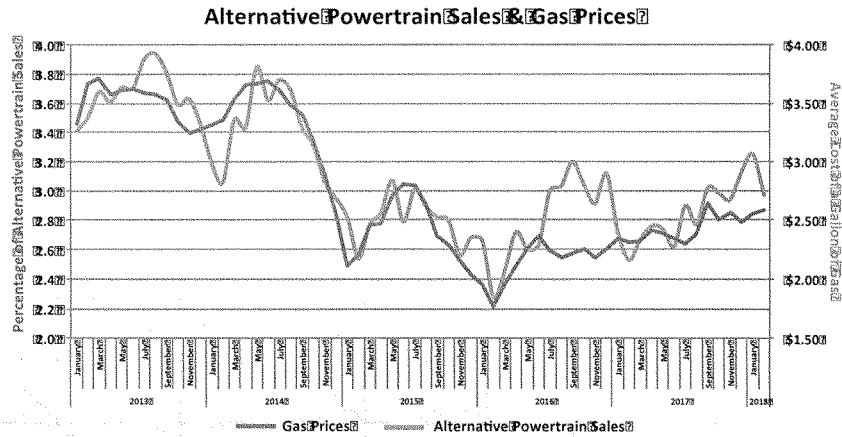


As Attachment 1 – shared with each of your offices in advance of today’s hearing – shows, the ZEV adoption in each of your states is illustrative of what consumers are buying, both in ZEV states and non-ZEV states.

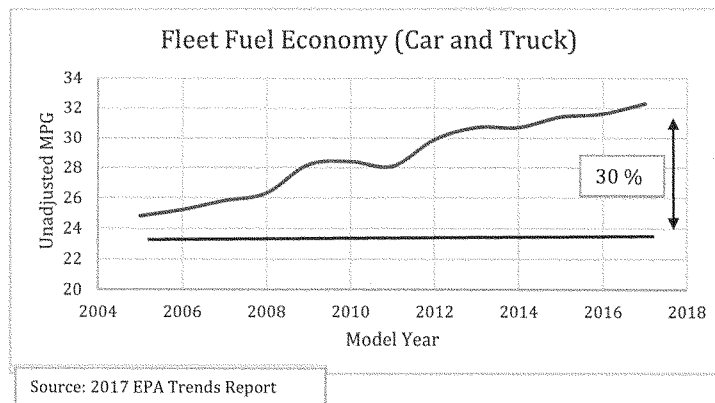
There are several factors influencing the consumer acceptance of EVs. Our consumer research has shown that a reticence to embrace electrification remains among car buyers. Whether it be cost, range anxiety, lack of necessary EV charging infrastructure or a lack of education surrounding the many benefits of EVs, many consumers are unaware or uncomfortable with this new technology.

In response, automakers have stepped up to help increase consumer awareness of EVs. This March, in conjunction with the New York International Auto Show, automakers partnered with the Northeast States for Coordinated Air Use Management to launch the “Drive Change, Drive Electric” campaign. This initiative is designed to increase EV use throughout the Northeast states, which are also states that follow the CA ZEV mandate, and focus on the benefits of EVs and advancing consumer awareness, understanding, consideration and adoption of these vehicles in the region. Additionally, to help amplify this effort, the Alliance has launched a complimentary national media campaign, entitled “Buyers Wanted,” to highlight the various fuel-efficient models available for purchase at dealerships.

Low gas prices are also a factor impacting the sale of EVs. I’ve highlighted in previous testimony before the Energy and Commerce Committee the linear relationship between gas prices and the adoption of fuel-efficient technologies. When gas prices fall, the desire to pay more for a vehicle with higher fuel economy diminishes.



In many ways, automakers are also victims of our own success and have made tremendous progress making the internal combustion engine much more efficient across all vehicle segments, pursuant to existing CAFE and GHG standards. As a result, consumers in the market for a new vehicle will find conventional vehicles 30 percent more efficient than 12 years ago. The fuel-efficiency gains combined with low gas prices demonstrate that the internal combustion engine will remain the predominant powertrain for the near future.



Bridging the Policy & Market Divide

So when is the tipping point for EVs? To be honest, we don't know when the adoption rate of electric and other zero emission vehicles will begin to experience mainstream acceptance, but we do know policy can play an important role in achieving that goal. So, what can policymakers do in the meantime?

The industry has responded and yet consumers are not seeking EVs in the percentage necessary to mark a shift. Policymakers should pursue policies that make the purchase of EVs more attractive. For example, automakers support the continuation of the federal EV tax incentive (up to \$7,500 for qualifying vehicles). This tax credit helps narrow the price gap between EVs and conventional vehicles but its capped at 200,000 units per manufacturer before it begins to phase-out. Some automakers have indicated that they will hit the cap later this year.

Additional policies could include state financial incentives, HOV access, parking benefits and, of course, infrastructure to recharge (or fuel in the case of hydrogen). Such incentives are critical to the widespread adoption and deployment of EVs. Further, increased popularity of hybrid-electric vehicles can help bridge the gap between conventional vehicles and EV powertrains. But even now, hybrids and EVs combined only account for roughly 3 percent of the market. It's also worth noting that hybrid-electric vehicle sales do not count towards the ZEV mandate.

Given that EVs will continue to share the road with conventional vehicles for years to come, automakers continue to support increased year-over-year fuel-efficiency standards and are investing heavily in new technologies to improve fuel economy for our customers and the environment. Within the context of the Midterm Evaluation of MY 2022-2025,

we support standards that increase year over year that also are consistent with marketplace realities. This is critical since compliance with the standards is determined by what vehicles consumers purchase, not what automakers put in dealer showrooms. Requirements that reflect market realities could be combined with various flexibilities that provide incentives for EVs and/or other vehicle technologies that provide additional environmental benefits.

As I previously mentioned, we continue to urge the Administration to preserve “One National Program” that includes California and we also urge California to seek a compromise solution as well. This would ensure that the CA and federal programs remain aligned and the same vehicles can be sold in all 50 states. We believe this scenario would also provide greater environmental benefits than two separate programs. Ultimately, the continuation of “One National Program” is the best outcome for our industry, consumers, our employees and the environment.

Additionally, and of particular interest to the Subcommittee, is the role that higher octane can play in this debate. The Alliance has long supported a transition to higher-octane gasoline and the need for vehicles and fuels to be regulated as a system. Higher octane gasoline in the marketplace is a cost-effective means of incrementally improving fuel economy for the light-duty vehicle fleet (which currently translate into 4-5 percent year over year improvements). However, before any of those benefits could be realized, automakers must have adequate lead-time to design and develop vehicles optimized for a new fuel, and to cost-effectively certify them as compliant with regulatory emission limits.

It is important to stress that the availability of any new fuel should coincide with the availability of the vehicles in the marketplace designed for its use, to assure optimal environmental and vehicle performance and to provide certainty for producers, retailers, and consumers.

Conclusion

We appreciate the work this Subcommittee and Committee have been conducting on these important policy issues. As the future of transportation and transportation fuels continues to evolve, automakers pledge to be a constructive partner in the process.

Thank you for consideration of our views.

ATTACHMENT 1

RETAIL AND FLEET SALES IN NON-ZEV AND ZEV STATES: 2013 AND 2017

House Energy and Commerce Environment Subcommittee Members

NATIONAL	<u>2013 RETAIL AND FLEET SALES</u>				<u>2017 RETAIL AND FLEET SALES</u>			
	<u>NON-ZEV VEHICLES</u>		<u>ZEV VEHICLES</u>		<u>NON-ZEV VEHICLES</u>		<u>ZEV VEHICLES</u>	
	SALES	%	SALES	%	SALES	%	SALES	%
United States	14,886,131	99.40	89,343	0.60	16,620,605	98.87	190,043	1.13
ZEV STATES	<u>2013 RETAIL AND FLEET SALES</u>				<u>2017 RETAIL AND FLEET SALES</u>			
	<u>NON-ZEV VEHICLES</u>		<u>ZEV VEHICLES</u>		<u>NON-ZEV VEHICLES</u>		<u>ZEV VEHICLES</u>	
	SALES	%	SALES	%	SALES	%	SALES	%
CALIFORNIA	1,622,479	97.66	38,821	2.34	1,907,440	95.19	96,407	4.81
NEW JERSEY	525,641	99.56	2,340	0.44	568,887	99.13	5,011	0.87
NEW YORK	906,824	99.56	3,976	0.44	1,008,887	99.01	10,098	0.99
OREGON	141,232	98.59	2,016	1.41	181,079	97.84	3,990	2.16
SUBTOTAL	4,136,034	98.75	52,417	1.25	4,672,547.00	97.34	127,483	2.66
NON- ZEV STATES	<u>2013 RETAIL AND FLEET SALES</u>				<u>2017 RETAIL AND FLEET SALES</u>			
	<u>NON-ZEV VEHICLES</u>		<u>ZEV VEHICLES</u>		<u>NON-ZEV VEHICLES</u>		<u>ZEV VEHICLES</u>	
	SALES	%	SALES	%	SALES	%	SALES	%
COLORADO	237,310	99.40	1,441	0.60	283,270	98.55	4,169	1.45
GEORGIA	413,139	98.91	4,541	1.09	485,223	99.49	2,466	0.51

ILLINOIS	585,185	99.56	2,562	0.44	638,037	99.40	3,839	0.60
MICHIGAN	493,784	99.47	2,634	0.53	633,110	99.57	2,763	0.43
MISSISSIPPI	105,576	99.94	64	0.06	122,050	99.89	136	0.11
NORTH CAROLINA	388,431	99.70	1,168	0.30	445,060	99.54	2,077	0.46
NORTH DAKOTA	43,381	99.94	24	0.06	37,368	99.90	39	0.10
OHIO	550,655	99.81	1,061	0.19	598,044	99.65	2,109	0.35
SOUTH CAROLINA	194,137	99.85	297	0.15	223,326	99.75	569	0.25
TENNESSEE	250,265	99.69	789	0.31	249,277	99.68	794	0.32
TEXAS	1,403,461	99.80	2,832	0.20	1,514,472	99.64	5,459	0.36
WEST VIRGINIA	83,627	99.87	109	0.13	80,364	99.86	113	0.14
SUBTOTAL	10,750,097	99.66	36,926	0.34	11,948,058	99.48	62,560	0.52

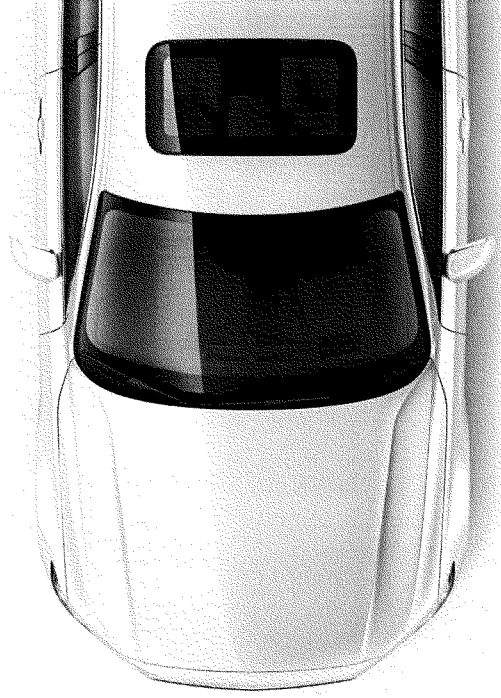
Source: Compiled by the Auto Alliance from IHS Markit new registration data

Sharing the Road: Policy Implications of Electric and Conventional Vehicles in the Years Ahead

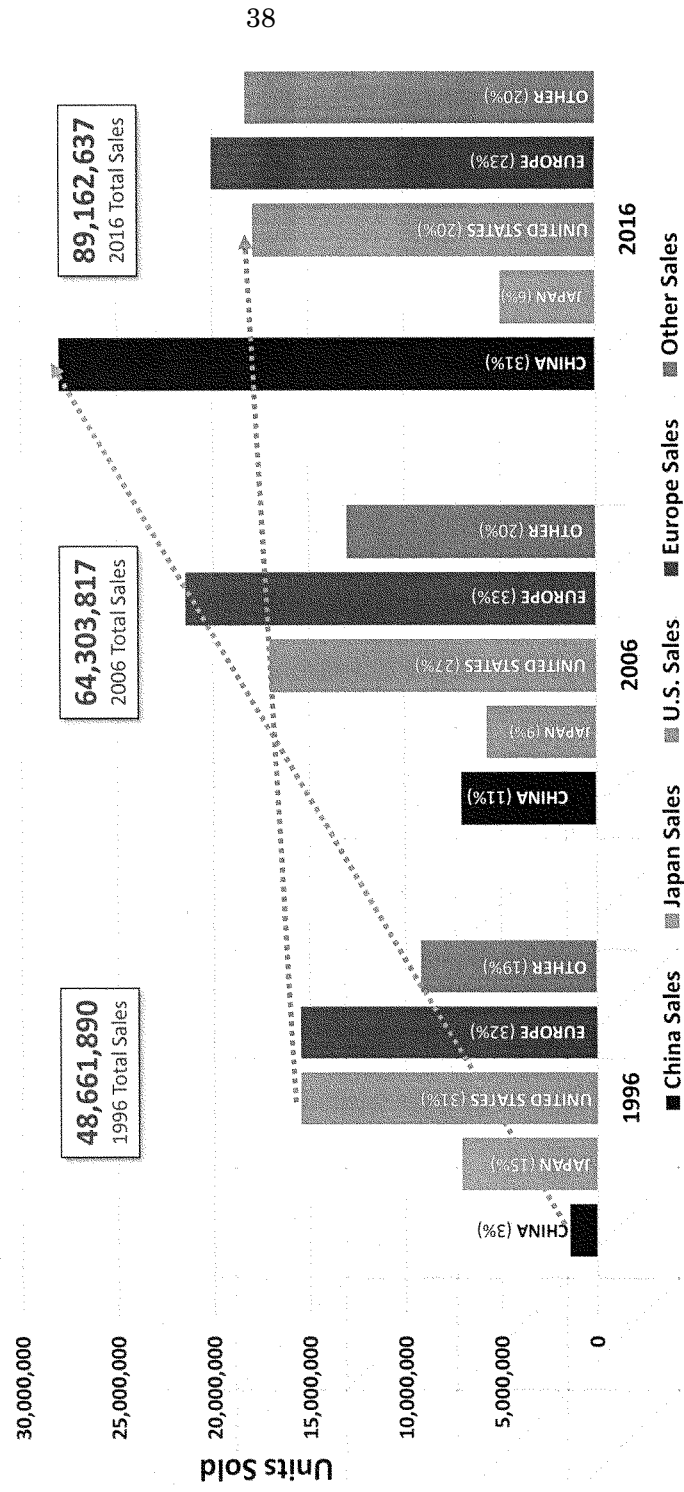
*House Energy and Commerce
Committee*

Subcommittee on Environment

MITCH BAINWOL, PRESIDENT & CEO, AUTO ALLIANCE



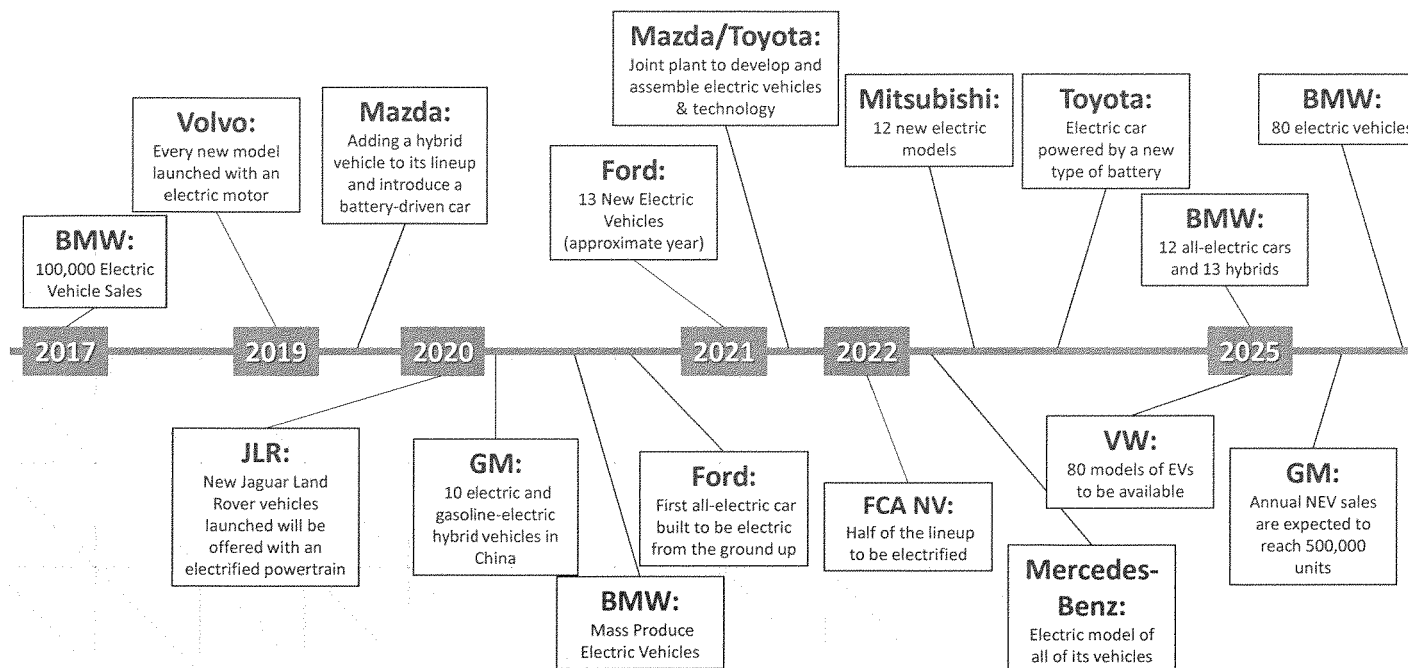
World Vehicle Sales: Rapid Growth



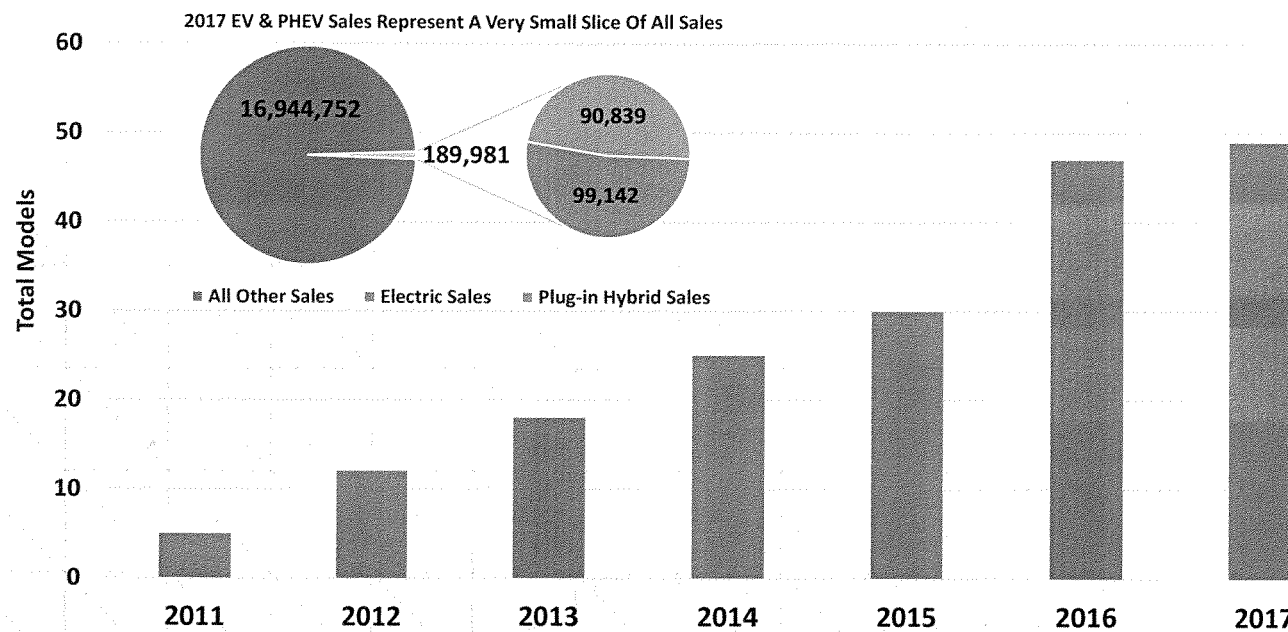




Automakers Responding to Policy

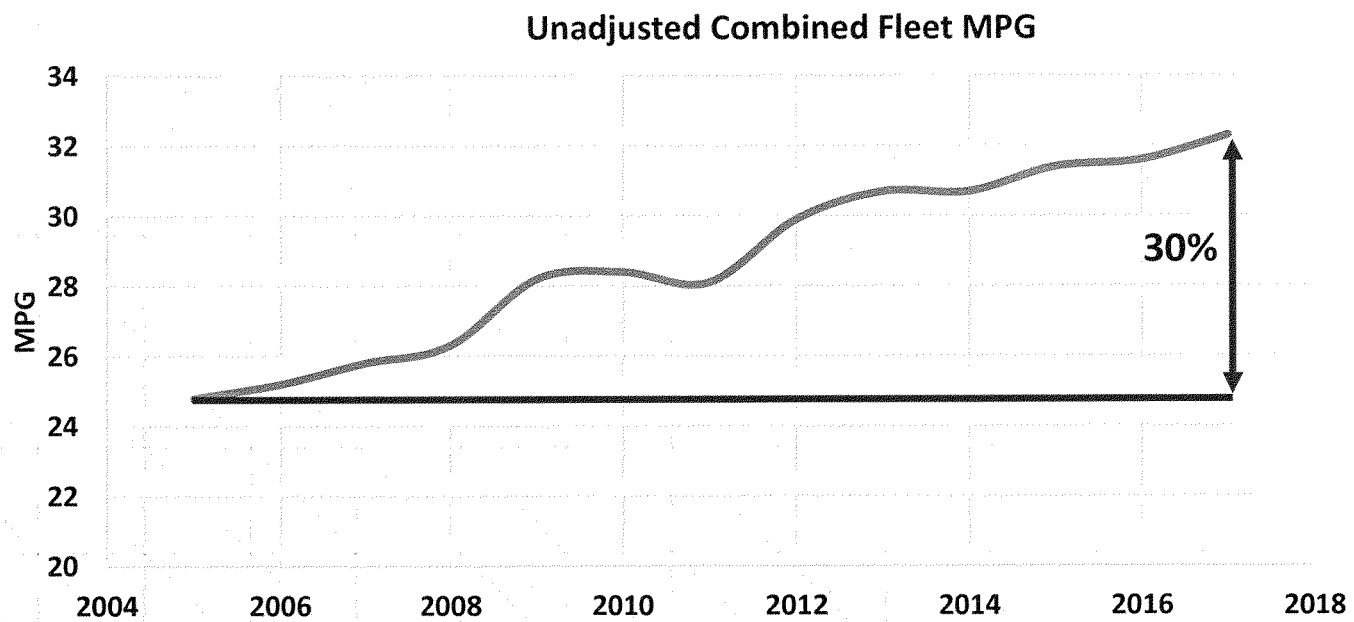


Many More EV/Hybrid Models But Sales Modest



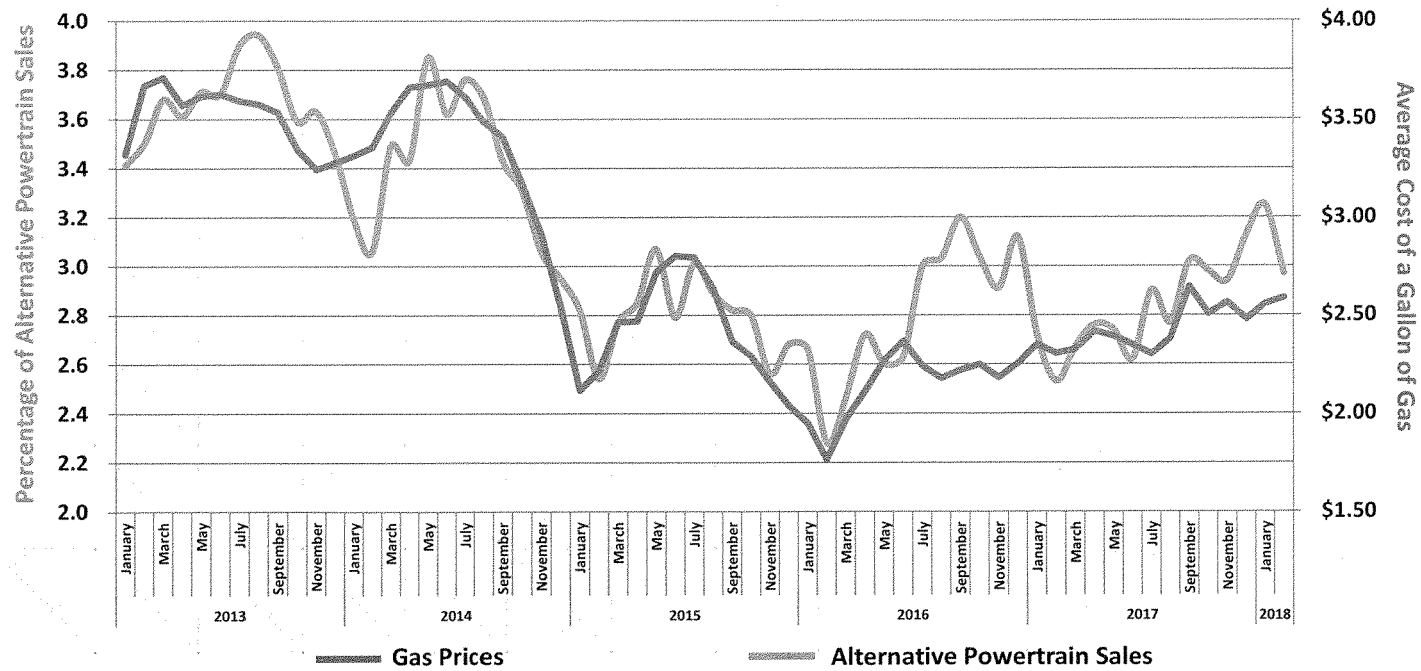
Source: Wards Automotive

Consumers Enjoying Fuel Economy Gains (New Cars & Trucks)

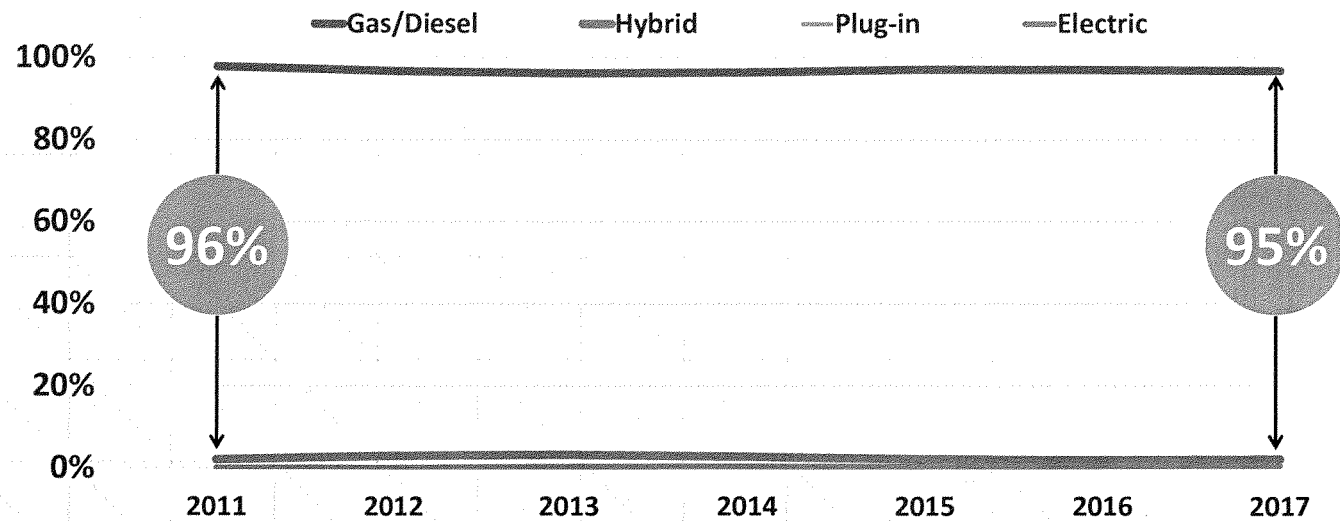


Source: 2017 EPA Trends Report

Swimming Together: Alternative Powertrain Sales & Gas Prices



Powertrain Share of Total Sales Essentially Static



Source: Ward's Automotive

RETAIL AND FLEET SALES IN NON-ZEV AND ZEV STATES: 2013 AND 2017

House Energy and Commerce Subcommittee Members

	<u>2013 RETAIL AND FLEET SALES</u>		<u>2017 RETAIL AND FLEET SALES</u>	
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OREGON	98.59	1.41	97.84	2.16
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NON- ZEV STATES	NON-ZEV VEHICLES (%)	ZEV VEHICLES (%)	NON-ZEV VEHICLES (%)	ZEV VEHICLES (%)
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GEORGIA	98.91	1.09	99.49	0.51
ILLINOIS	99.56	0.44	99.40	0.60
MICHIGAN	99.47	0.53	99.57	0.43
MISSISSIPPI	99.94	0.06	99.89	0.11
N. CAROLINA	99.70	0.30	99.54	0.46
N. DAKOTA	99.94	0.06	99.90	0.10
OHIO	99.81	0.19	99.65	0.35
S. CAROLINA	99.85	0.15	99.75	0.25
TENNESSEE	99.69	0.31	99.68	0.32
TEXAS	99.80	0.20	99.64	0.36
W. VIRGINIA	99.87	0.13	99.86	0.14
SUBTOTAL	99.66	0.34	99.48	0.52

Green and Infrastructure Policy Collide



Roads and Bridges



GHG

Mr. SHIMKUS. Thank you very much.

The chair now recognizes Genevieve Cullen, President, Electric Drive Transportation Association. You are recognized for 5 minutes. Thanks for being here.

STATEMENT OF GENEVIEVE CULLEN

Ms. CULLEN. Thank you. Good morning Chairman Shimkus, Ranking Member Tonko, and members of the committee. I am Genevieve Cullen, President of the Electric Drive Transportation Association. Our membership includes the entire electric drive value chain including vehicle, battery, and component manufacturers as well as utilities and infrastructure developers who are advancing e-mobility. Using electricity to power a hybrid, plug-in hybrid, battery and fuel cell electric vehicles enhances our energy security with fuel diversity and ensures our competitiveness in the global race for new technology while reducing transportation costs and emissions.

A brief look at the numbers, the same numbers that Mitch uses but from a slightly different lens shows a growing market for electric drive, since the commercial scale introduction of plug-in vehicles in late 2010 the electric drive segment has grown from two to almost fifty models including three models of fuel cell vehicles. More than 800,000 electric vehicles have been sold to date and annual sales are continuously increasing. 2017 sales showed a 71 percent increase over 2015 in the face of stable and low gas prices.

The diversity of the electric drive market is also increasing. We are seeing a expanded offerings across a range of price points in vehicle categories including trucks, buses, and mobile equipment. Looking ahead, a survey of major industry and analyst projections shows uptake increasing substantially in the next decade and beyond. For instance, the Boston Consulting Group predicts that EVs could be more than 20 percent of the U.S. new car registrations by 2030. Bloomberg New Energy Finance estimates that global electric drive sales will reach parity with internal combustion sales by 2038.

While the numbers and timelines have some variability, the direction of the market is clear. Electrification will shape the future of mobility. The global opportunity in e-mobility has not gone unnoticed by our competitors. Although not alone in its pursuit, China is making an aggressive push to dominate this market and they could succeed. The Wall Street Journal recently reported that 40 percent of global investment in electric vehicles is occurring in China. Meanwhile, electric charging and hydrogen fueling infrastructure are expanding to serve this market. DOE reports more than 20,000 charging stations in operation today. More will be needed to serve diverse driving and charging needs.

Electric transportation advances are also reinforcing growth in automation, connectivity, and shared mobility. While the continuum of autonomous technology is being built into vehicles today is not exclusive to it, electric drive is in many ways the optimal partner. The smart technologies of the future will be built on electrified platforms. In that vein, we thank the committee for its leadership in this area through H.R. 3388, the SELF DRIVE Act. The

advances we have been talking about have positive implications for consumers, businesses, and the country.

For drivers, e-mobility means wider options and reduced costs. For the country, the growth of this market is building an advanced technology value chain that is creating jobs, expanding manufacturing in the United States, and bolstering our position in the global race for electrification. An electrified transportation sector will also increase our energy security, reducing our reliance on a single transportation fuel while reducing transportation emissions.

So where do we go next? To secure these benefits and the U.S. position in the global marketplace we need to grow. I think we can all agree to that. We are still an emerging market of new technologies pushing to deliver ever-enhanced performance at reduced cost while building volume. To achieve that scale, the industry is investing in technology development, market expansion, and infrastructure at the local, regional, and national scale. Public policies can reinforce that work and speed achievement of these benefits.

In conclusion, industry investment trends, technology advances, and global market imperatives all point to electrification. Accelerating that movement is a critical opportunity for continued United States leadership in a market that we built. Neglecting that opportunity is a choice to follow rather than lead in the world market for electric transportation. Again I thank you for the opportunity to be here today and I look forward to your questions.

[The prepared statement of Ms. Cullen follows:]

TESTIMONY OF
GENEVIEVE CULLEN, PRESIDENT
ELECTRIC DRIVE TRANSPORTATION ASSOCIATION
BEFORE THE
HOUSE ENERGY AND COMMERCE SUBCOMMITTEE ON ENVIRONMENT
MAY 8, 2019

Good morning, Chairman Shimkus, Ranking Member Tonko and members of the Committee. I am Genevieve Cullen, President of the Electric Drive Transportation Association. Thank you for the opportunity to speak with this committee about the emerging market for electric transportation and the outlook for electricity as a transportation fuel.

The Electric Drive Transportation Association (EDTA) is the cross-industry trade association promoting the advancement of electric drive technology and electrified transportation. EDTA membership includes the entire electric drive value chain – including established and emerging vehicle, battery and component manufacturers, as well as electricity providers, smart grid and infrastructure developers.

Collectively, our membership is developing and manufacturing the vehicles and infrastructure of an electrified fleet. By using electricity to power hybrid, plug-in hybrid, battery and fuel cell electric vehicles, electric drive offers high performing, affordable and efficient alternatives to oil.

Because the technology allows for flexibility in how these solutions are used across different vehicle platforms, manufacturers are able to meet the increasingly diverse operational demands of consumers and businesses. In addition to light duty cars, electric drive is being built into medium- and heavy-duty trucks, buses, utility vehicles and mobile equipment.

Sales of electric drive vehicles in 2017 increased 24 percent over 2016. Today, there are more than 760,000 on the road and infrastructure is expanding to serve these vehicles. Industry and analyst projections show uptake increasing in the next decade and beyond, with Bloomberg New Energy Finance estimating that global electric drive sales will reach parity with internal combustion sales by 2038.ⁱ

For drivers of electric vehicles, this means wider options and reduced costs - for vehicles and fuel. At the gasoline equivalent of roughly \$1 per gallon, electricity is a low-cost transportation fuel.

For the country, the growth of this market is expanding an advanced technology supply chain. This supply chain is creating jobs, expanding manufacturing in the U.S. and bolstering our position in the global race to dominate this technology and this market. An electrified transportation sector will also increase our energy security, reducing our reliance on a single transportation fuel while reducing transportation emissions.

Electric transportation advances are also accelerating transformational changes in the sector that include increasing automation, connectivity and shared mobility. The smart technologies of the future will be built on electrified platforms.

To secure these benefits and the U.S. position in the global marketplace, we need to continue to advance technology development, build markets and enable expansion of infrastructure at the local, regional and national scale.

MARKET SNAPSHOT

Since the commercial scale introduction of plug-in vehicles in late 2010, the electric drive segment has grown exponentially – from two to almost 50 battery and plug-in hybrid models for sale today. Sales in 2017 represented a 24 percent increase over 2016 and a 71 percent increase over 2015.

The diversity of the electric drive market is also accelerating. Automakers have announced plans for expanded vehicle offerings and increased electrification across their fleets in the next decade. These vehicles include offerings across a range of price points, performance profiles and vehicle categories – from economy to luxury.

Fuel cell vehicles, which can offer approximately 300 to 400 miles of range and five minute refueling times, are increasing the variety of electric transportation options. There are currently three commercially available fuel cell electric vehicles from Toyota, Honda and Hyundai, with many other manufacturers forming collaborations with each other to speed development and reduce costs to bring additional vehicles to market.

Electrification is also increasing in the commercial vehicle segment with medium- and heavy-duty battery electric and fuel cell electric vehicles entering the transit, utility, long haul and drayage segments. Battery electric and fuel cell buses are providing transit options to cities seeking zero emission options. Additional commercial applications are emerging; Navigant reports that electric drive truck and bus sales are projected to surpass other alternative fuels powertrains by 2030.ⁱⁱ

For instance, in the Port of Long Beach, Toyota Motor North America, Inc.'s (TMNA) "Project Portal" is demonstrating a hydrogen fuel cell system designed for heavy-duty truck use. Portal was deployed at the Port of Los Angeles in summer 2017, to conduct port drayage operations – short haul cargo movements in and around the Port - as part of a feasibility study examining the performance of fuel cell vehicles in heavy-duty applications. To date, the truck has logged over 8,500 miles hauling cargo. Shell Oil Products US and Toyota have been provisionally awarded \$8 million by the California Energy Commission (CEC) to develop the first hydrogen-truck refueling station at the Port of Long Beach.

Large fleets are looking to electrify as well. Anheuser-Busch announced recently that it will order up to 800 fuel cell electric semi trucks by 2025 that will reduce the company's logistics emissions by 18 percent.

MARKET OUTLOOK

Total sales of plug-in vehicles in the U.S. surpassed 760,000 in 2017. Market watchers are projecting that uptake will increase substantially in the next decades. Bloomberg New Energy Finance predicts that electric vehicle sales will surpass internal combustion engines sales by 2038.ⁱⁱⁱ

Almost every major automobile manufacturer has announced multi-year plans for development investment, product line expansion and targets for electric drive sales shares.

For the U.S., these announcements, along with trends in technology costs and other market factors, inform projections of accelerating sales. The Edison Foundation and Edison Electric Institute projection of 1.2 million EV sales in the US by 2025 and Navigant's of over 1.25 million EV sales by 2025.^{iv} The Boston Consulting Group predicts that EVs could be more than 20 percent of U.S. new car registrations by 2030.^v

Growth is also projected on a global scale. The Organization of Petroleum Exporting Countries (OPEC) increased its global uptake projection upward by 500 percent between 2015 and 2016 (from 46 to 266 million electric vehicles). BP's Energy Outlook 2018 also increased its projection for plug-in vehicle uptake to 300 million by 2040.^{vi}

The International Energy Agency's EV Outlook for 2017 concluded that "country targets, original equipment manufacturer (OEM) announcements and scenarios on electric car deployment seem to confirm these positive signals, indicating a good chance that the electric car stock will range between 9 million and 20 million by 2020 and between 40 million and 70 million by 2025."

While the numbers and timelines have variability, the national and world global market trends are clear. Electrification will shape the future of mobility.

The global opportunity has not gone unnoticed by U.S. competitors. The Wall Street Journal recently reported that, "even though Beijing cut subsidies for electric-vehicle makers by as much as 40 percent during last year and imposed tougher technological standards, Chinese electric-car sales rose more than 80 percent from a year earlier in November. Both production and sales of electric cars were up about 50 percent in the first 11 months of last year... In turn, China has become the industry's clear global leader: 40 percent of global investment in electric vehicles happens there."^{vii}

ELECTRIC DRIVE INNOVATION BENEFITS

In the U.S., this market growth is building value and jobs throughout the electric drive supply chain. Of the U.S. plug-in vehicle (PEV) population, which includes both all-electric and plug-in hybrid light vehicles, nearly two-thirds were assembled in the United States.^{viii}

According to the U.S. Department of Energy, in 2015, more than 215,000 employees were working in the "Motor Vehicles and Component Parts" segment alone. Employment in that segment and through the value chain of the industry has been increasing annually.

Ongoing research and development in battery technology and cost reductions contribute to the positive outlook for this segment of the market. Investments in research and development is enhancing the performance and reducing the cost of electric drive batteries, fuel cells, components and materials. The cost of lithium ion batteries, roughly \$1000/kWh in 2008 is estimated at less than \$200/kWh in 2018.

Innovation in electric drive is not limited to vehicles. Vehicle manufacturers are forging new collaborative models to drive down ecosystem costs and build out infrastructure. Utilities are creating new business models with smarter demand management mechanisms to serve this mobile load and maximize the potential roles of automotive energy storage that these micro-storage units can provide to the grid and to their customers.

Vehicle, battery and energy companies are collaborating to scale battery production and diversify energy storage options at the home and commercial scale. Automobile manufacturers are also working with utility and infrastructure partners to create stand-alone energy storage systems that can be connected to, or operate independently of, the grid.

Expanding secondary uses provides an additional revenue stream in vehicle batteries and enables wider adoption of renewable generation. Grid and distributed storage gives energy consumers greater control over their energy choices and enhances grid stability and efficiency.

Expanding Infrastructure

Electric vehicle charging facilities have expanded rapidly in the last 5 years. DOE reports approximately 20,000 charging stations, representing more than 50,000 outlets. The charging segment – known as the Electric Vehicle Service Equipment, or EVSE, industry – is fast growing and diverse.

Building out infrastructure to serve the increasingly electrified transportation sector is an industry priority. New entrants and partnerships are expanding options for charging using Level 1, Level 2, DC Fast Charge and wireless charging applications. Sales of DC fast chargers are expected to rise from around 20,000 in 2017 to over 70,000 annually by 2026.^{ix}

New business models are emerging to leverage hardware and software capabilities and satisfy diverse customer needs for charging locally, in commercial retail locations, and on interstate highways. Vehicle manufacturers and EVSE companies are collaborating to expand charging infrastructure; utilities are working across industries to plan for and invest in electric charging facilities to meet customer needs.

Looking ahead to a seamless national network of electric charging, a recent study by the National Renewable Energy Laboratory shows that a few hundred fast-charging stations along main interstate corridors could enable plug-in electrics to travel between U.S. cities. Additionally, fast-charging stations inside cities and towns mean plug-ins travel is possible throughout most of the continental United States. The study estimates that about 8,000 fast-charging stations could provide a threshold level of urban and rural coverage nationwide.^x

Meanwhile, hydrogen infrastructure is emerging alongside introduction of mass-market fuel cell electric vehicles. Today, there are 42 retail hydrogen stations, with the majority in California. Public/private collaborations in California and other states are advancing deployment of additional hydrogen infrastructure in early markets.

Autonomy and New Mobility Models

Electric drive transportation is also reinforcing the advance of autonomy in vehicles. While the continuum of autonomous technologies being built into vehicles today is not exclusive to electric drive vehicles, electric drive is in many ways the optimal partner.

Increased connectivity and autonomy are changing mobility. In particular, personal mobility is expanding to include non-ownership and on-demand car use. Electric drive is optimized for the car-sharing paradigm, with electric ranges and efficient technologies, such as regenerative braking, which are maximized during the urban driving that dominates this market.

We thank the Committee for its leadership in advancing automation through its work on developing and passing HR 3388, the SELF DRIVE Act.

Speed Innovation

As detailed here today, electric drive technologies and the industries commercializing them are making great strides. Innovations in electric drive transportation that enhance performance and reduce costs are providing consumers, businesses and governments greater options while reducing emissions and diversifying the transportation sector's dependence on oil. The accompanying advances across the electric drive ecosystem, in infrastructure, energy management and connectivity are also remaking business models for mobility, energy, and connectivity.

Electrification enhances our energy security with fuel diversity, ensures our competitiveness in the global race for new technology while reducing energy costs for drivers and public health costs of emissions. To achieve those benefits, we need to grow the industry.

We are still an emerging market and pushing to deliver enhanced performance at reduced cost while building to full scale. Public/private partnerships throughout the value chain- from technology to infrastructure build-out, are critical to speeding those innovations.

Policies that can speed achievement of scale include consumer incentives for vehicle and infrastructure purchases, federal investment in research and development and support for expanding infrastructure locally, regionally and nationally.

RESEARCH & DEVELOPMENT POLICY

Federal transportation research, development and deployment programs are reducing oil dependence, protecting American consumers from price volatility and increasing U.S. manufacturing competitiveness. The Department of Energy's (DOE's) Vehicle Technologies program is a critical element of the national effort to increase fuel diversity, leveraging private sector investments to promote innovation in advanced vehicles and infrastructure and manufacturing chains by advancing research in batteries and power electronics, electric drive motors, components and charging technologies. The Vehicle Technologies program also is advancing alternatives in commercial vehicles, which are projected to experience the fastest increases in energy demand among all transportation modes from 2010 to 2040. In the Hydrogen and Fuel Cell Technologies program, DOE is working with industry to accelerate the availability of fuel cell electric vehicles, which are essential "zero emission" options in the alternative fuel transportation portfolio.

INFRASTRUCTURE POLICY

Federal infrastructure policy needs to recognize electric drive as an essential component of 21st century mobility. Federal support for innovative investment can speed national-scale electric charging and hydrogen refueling options to meet the diverse needs of an evolving U.S. vehicle fleet. Existing programs, such as the Congestion Mitigation and Air Quality program and the Clean Cities program are pathways to scaling infrastructure. New financing mechanisms can leverage federal resources to help states and localities invest in infrastructure solutions that serve their residents.

TAX POLICY

Policies promoting fuel diversity, including tax incentives, have been shown to be effective, market-driven tools for increasing energy and economic security. The credits for alternative fuel infrastructure (IRC Section 30C) and fuel cell vehicles (IRC Section 30B) are among those that expired at the end of 2016 and were recently extended retroactively to apply to 2017. In addition, several vehicle manufacturers are approaching the 200,000 per manufacturer phase-out of the credit (IRC Section 30D) for plug-in electric drive vehicles. Updating these credits to ensure their continued effectiveness will promote manufacturer and consumer investment, with the taxpayer return being increased energy and economic security and more robust American manufacturing and industry competitiveness.

In conclusion, industry investment, technology advances and global market imperatives illustrate that the transportation sector is moving toward electrification. Accelerating that movement is a critical opportunity for continued United States leadership in a market that we built. Neglecting the opportunity is a choice to follow, rather than lead the world, in the future of transportation.

Again, I thank you for the opportunity to speak with you today and I look forward to your questions.

ⁱ Bloomberg New Energy Finance, Electric Vehicle Outlook 2017, <https://about.bnef.com/electric-vehicle-outlook/>

ⁱⁱ Transportation Forecast: Medium and Heavy Duty Vehicles, Global Forecasts of Commercial Trucks and Buses by Region and Powertrain: 2017-2035, Navigant Consulting, 2017

ⁱⁱⁱ Op cit.

^{iv} Plug-in Electric Vehicle Sales Forecast Through 2025 and the Charging Infrastructure Required 2017, Edison Foundation Institute for Energy Innovation and Edison Electric Institute http://www.edisonfoundation.net/iei/publications/Documents/IEI_EEI%20PEV%20Sales%20and%20Infrastructure%20t%202025_FINAL%20%282%29.pdf

^v Boston Consulting Group February, 2018 <https://www.bcg.com/publications/2018/are-oil-companies-ready-for-next-energy-transition-us.aspx>

^{vi} BP Energy Outlook 2018 edition <https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/energy-outlook/bp-energy-outlook-2018.pdf>

^{vii} China's Electric Car Market Has Grown Up, Wall Street Journal, February 17, 2018 <https://www.wsj.com/articles/chinas-electric-car-market-has-grown-up-1515380940>

^{viii} Argonne National Laboratory, *Impacts of Electrification of Light-Duty Vehicles in the United States, 2010-2017*, ANL/ESD-18/1, January 2018.

^{ix} Navigant Consulting, DC Fast Charging for EVs, 2017 <https://www.navigantresearch.com/wp-assets/brochures/RB-DCEV-17-Executive-Summary.pdf>

^x *National Plug-In Electric Vehicle Infrastructure Analysis*, September 2017.

SUMMARY
OF
TESTIMONY OF
GENEVIEVE CULLEN, PRESIDENT
ELECTRIC DRIVE TRANSPORTATION ASSOCIATION
BEFORE THE
HOUSE ENERGY AND COMMERCE SUBCOMMITTEE ON ENVIRONMENT
MAY 8, 2019

Introduction

The Electric Drive Transportation Association (EDTA) is the cross-industry trade association promoting the advancement of electric drive technology and electrified transportation. Collectively, our membership is developing and manufacturing the vehicles and infrastructure of an electrified fleet. By using electricity to power hybrid, plug-in hybrid, battery and fuel cell electric vehicles, electric drive offers high performing, affordable and efficient alternatives to oil across the fleet. .

The market is growing and the trend toward electrification is projected to accelerate over time.

Diverse industry analysts are projecting substantial growth in the electric drive market and increasing electrification of the vehicle fleet.

Electric drive vehicles and the electrification of the vehicle fleet provides benefits to consumers and to the country:

For drivers of electric vehicles, this means wider options and reduced costs - for vehicles and fuel. .

For the country, the growth of this market is expanding an advanced technology supply chain that is creating jobs, expanding manufacturing in the U.S. and bolstering our position in the global race to dominate this technology and this market.

An electrified transportation sector will also increase our energy security, reducing our reliance on a single transportation fuel while reducing transportation emissions.

Electric transportation advances are also accelerating transformational changes in the sector that include increasing automation, connectivity and shared mobility. The smart technologies of the future will be built on electrified platforms.

To secure these benefits and the U.S. position in the global marketplace, federal policies can advance technology development, build markets and enable expansion of infrastructure at the local, regional and national scale.

Mr. SHIMKUS. Thank you very much. The chair now recognizes Bob Dinneen, President and CEO of the Renewable Fuels Association. Welcome, you are recognized for 5 minutes.

STATEMENT OF BOB DINNEEN

Mr. DINNEEN. Good morning Chairman Shimkus, Ranking Member Tonko, and members of the subcommittee. I greatly appreciate the opportunity to be with you again to present the views of the American fuel ethanol industry.

Liquid fuels and internal combustion engines will continue to drive America for decades to come and despite what you might hear, these are not fully mature technologies. Plenty of room remains for the improved performance of both. We need to make sure that the technologies literally and figuratively driving our economy compete in a policy environment that maximizes efficiency and carbon reduction and allows fair access to a market that has largely been closed to competition for more than a century.

As you heard at your hearing 2 weeks ago, ethanol is the lowest cost and cleanest source of octane on the planet and research has shown that a mid-level ethanol blend could deliver tremendous efficiency benefits if used in an optimized engine. However, if the move toward higher octane fuels simply encourages more hydrocarbon aromatics, a huge opportunity will be lost and consumers will be paying more for fuels that pollute more, are imported more, and increase carbon more.

This committee has already led when it comes to transformative energy policy. The RFS, for example, remains a beacon of success that is being emulated as other countries seek to expand their production and use of renewable fuels to address the same energy, economic, and environmental imperatives that drove this committee to pass the RFS a decade ago.

Yes, there are critics of the policy, those who want to ignore the economic and environmental consequences of unfettered petroleum use, but consumers appreciate the savings at the pump resulting from the increased use of lower priced biofuels. Farmers appreciate an important value-added market that means fewer taxpayer dollars being spent on farm programs, environmentalists recognize that we have made an important first step in addressing global climate change, and national security hawks most certainly value the fact we are relying more on renewable fuels produced in the Midwest and less on fossil energy from the Middle East.

That is why EPA Administrator Pruitt's campaign to destroy RFS demand is being met with such virulent opposition. By issuing secret hardship waivers to highly profitable refineries, by ignoring a court-ordered reallocation of 500 million gallons in 2016 RFS obligations, and by forgiving more than half of the RFS obligation for an aging and noncompetitive refinery that has scapegoated the RFS. EPA has done great damage to this important program. Those actions send the wrong signals to the fuel producers and automakers who are poised to make huge investments in the next generation of fuels and vehicles.

The ethanol industry recognizes a broad array of electric vehicle technologies are on the horizon and we want them to succeed. We do not see electric vehicles as a threat, rather, we see electric vehi-

cles as fellow travelers on our road toward energy independence and decarbonization. It will take all innovative technologies for us to succeed. Indeed, I will tell you, although I would appreciate it if you didn't tell my board of directors that my wife drives a hybrid electric car. She loves it, I don't. It is too small for me, big surprise. I much prefer my flex-fuel Chevy pickup, but that just underscores my point.

There will be consumers for whom electric vehicles work well for their taste, their lifestyle, and their wallets and there will be consumers who will continue to prefer liquid transportation fuels. Public policy needs to make room for both and ought not put the heavy finger of government on the scale in favor of any one technology. Today, for example, EVs are effectively treated as zero emission vehicles because the upstream source of the electricity is not considered. That is not only inaccurate, it provides EVs with an incentive relative to other decarbonization technologies. Compliance values from all technologies should be based on full, direct, well-to-wheels lifecycle emissions that would allow for an apples-to-apples treatment of their greenhouse gas emissions.

We believe ethanol and EVs can play a complementary role in the long term. In 2016, Nissan unveiled the prototype of a vehicle powered by solid oxide fuel cells that uses ethanol as the fuel. Last month, Toyota revealed its first prototype of a hybrid electric vehicle powered by a flexible fuel internal combustion engine that can run on any blend of ethanol and gasoline. Ford has also experimented with ethanol flex-fuel hybrid EV technology.

A global policy shift is taking place driving transportation toward low carbon technologies. Renewable fuels have a key role to play in the development of this new mobility. We believe a combination of technologies with ethanol could be the answer so long as there is a level playing field. Together we can work to increase efficiencies and reduce costs for consumers, it is not one or the other. Thank you and I look forward to our questions.

[The prepared statement of Bob Dinneen follows:]



Testimony of
Bob Dinneen
President & CEO, Renewable Fuels Association
Before the
Committee on Energy and Commerce,
Subcommittee on Environment Hearing
“Sharing the Road: Policy Implications of Electric and Conventional
Vehicles in the Years Ahead”
May 8, 2018

Good morning, Chairman Shimkus, Ranking Member Tonko, and Members of the Subcommittee. My name is Bob Dinneen and I am president and CEO of the Renewable Fuels Association (RFA), the national trade association representing the U.S. ethanol industry.

The RFA has been the leading trade association for America’s renewable fuels industry for over 37 years. Our mission is to advance the development, production and use of renewable fuels by strengthening America’s ethanol industry and raising awareness about the benefits of biofuels. Founded in 1981, RFA serves as the premier organization for industry leaders and supporters. With over 300 members we are working to help America become cleaner, safer, more energy secure, and economically vibrant.

RFA appreciates the opportunity to appear before the Subcommittee today. This is an important and timely hearing as we look to the future of mobility. We believe renewable fuels are a key component to the future. There is no disagreement that new technologies will coexist with conventional technology; they are not mutually exclusive. We believe the future is bright for U.S. produced ethanol and other emerging biofuel technologies and we look forward to working with you to create a policy environment that builds upon existing technology and program successes, while driving innovation and efficiency in ways that maximize consumer acceptance and cost effectiveness. We believe ethanol and other renewable liquid transportation fuels provide numerous benefits that will help achieve those policy goals going forward.

Background

Today, ethanol is blended into roughly 97 percent of the gasoline sold in the U.S., the majority as E10 (10 percent ethanol and 90 percent gasoline) – a blend component adding octane, displacing toxics and helping refiners and auto makers alike meet Clean Air Act specifications. Not only is ethanol a thoroughly tested, safe, and effective motor fuel, it is the lowest cost source of octane available to refiners today. Increasing the use of domestic renewable fuels like ethanol is the first, and arguably, the easiest step we can take to improve automotive efficiency with higher octane fuels, lower tailpipe emissions of toxic pollutants, and reduce greenhouse gases from transportation while saving consumers money at the pump.

Ethanol production has and will continue to contribute to our nation’s financial well-being as well as that of American households. Overall, the production of 15.8 billion gallons of ethanol in 2017 directly employed 71,906 American workers. In addition, the ethanol industry supported 285,587 indirect and induced jobs across all sectors of the economy. The industry created \$24 billion in household income and contributed \$45 billion to the national Gross Domestic Product (GDP). Moreover, ethanol producers paid nearly \$10 billion in federal, state and local taxes, and spent \$32 billion on raw materials, inputs, and other goods and services.

I. While electric vehicles continue to make inroads into the U.S. automotive fleet, internal combustion engines will serve as the predominant propulsion technology for light duty vehicles for decades to come

It is broadly understood that internal combustion engines powered by liquid fuels will continue to serve as the most prevalent propulsion technology for light duty vehicles for decades to come. In fact, the U.S. Environmental Protection Agency (EPA) states that “very low levels” of full electrification (plug-in electric vehicles) are expected in the fleet by 2025.¹ Further, in a report released earlier this year, the Department of Energy’s Argonne National Laboratory found that through 2017, just 750,000 plug-in EVs have been sold in the United States.² This represents about 0.3% of the 259 million registered motor vehicles in the U.S. automotive fleet.³

¹ EPA, NHTSA, CARB. July 2016. Draft Technical Assessment Report, at ES-2

² Argonne National Laboratory. January 2018. Impacts of Electrification of Light-Duty Vehicles in the United States, 2010-2017. <http://www.ipd.anl.gov/anlpubs/2018/01/141595.pdf>

³ Federal Highway Administration. Highway Statistics 2016; State Motor-Vehicle Registrations – 2016. <https://www.fhwa.dot.gov/policyinformation/statistics/2016/mv1.cfm> (Excludes buses and motorcycles)

While annual sales of EVs are indeed accelerating⁴, the massive scale of the U.S. automotive fleet and the relatively slow turnover rate means internal combustion engines and liquid fuels will play a critically important role in the lives of American families for decades to come.

II. The efficiency of modern internal combustion engines can be significantly improved through increased adoption of incremental technologies that exist today or are near commercialization

Because the internal combustion engine will continue to serve as the primary means of mobility for decades to come, it is imperative that additional efforts be undertaken to improve the efficiency and environmental performance of these engines and the liquid fuels that are combusted in them. Contrary to conventional wisdom, neither internal combustion engines nor liquid fuel formulations are mature technologies. Both can be vastly improved.

According to EPA and NHTSA, even modest internal combustion engine improvements can enable compliance with MY2022-2025 fuel economy and GHG emissions standards: “The agencies’ analyses each project that the MY2022-2025 standards can be met largely through improvements in gasoline vehicle technologies, such as improvements in engines....”⁵ Indeed, the agencies project market penetration rates of just 2-3% or less will be necessary for full hybrids, plug-in hybrid electric vehicles, and battery electric vehicles to meet the MY2025 standards, while penetration rates of 33-54% are expected for certain advanced internal combustion engine technologies, such as turbocharging and higher compression ratios.⁶

The agencies’ views that internal combustion engines will continue as the predominant powertrain technology through at least 2025, and that significant gains in engine efficiency are likely, are consistent with the positions of leading experts in the automotive engineering field. Moreover, the agencies’ analysis showing that the costs of key advanced internal combustion engine technologies are lower than costs for other powertrain options is also generally aligned with stakeholder positions. According to Paul Whitaker, powertrain and technical director for AVL Power Train Engineering, “We see big efficiency improvements with internal combustion engines today and see the potential for lots more in the future, and they are very inexpensive relative to the other options.”⁷ Additionally, the U.S. Department of Energy (DOE) states that “...vehicles with internal combustion engines will continue to comprise a significant portion of the nation’s vehicle fleet for

⁴ Argonne National Laboratory. January 2018. Impacts of Electrification of Light-Duty Vehicles in the United States, 2010-2017. <http://www.ipd.anl.gov/anlpubs/2018/01/141595.pdf> (“From 2011 to 2017, annual PEV sales grew from under 18,000 to nearly 200,000, equivalent to a year-over-year growth rate of 49%.”)

⁵ EPA, NHTSA, CARB. July 2016. Draft Technical Assessment Report, at ES-9.

⁶ *Id.*, Table ES-3 at ES-10

⁷ Detroit Public Television. Aug. 21, 2016. *Autoline with John McElroy*. Episode #2026 (“Deep Freeze for the ICE?”)

the next several decades.”⁸ Further, the National Research Council (NRC) states, “...spark-ignition engines are expected to be dominant beyond 2025.”⁹

III. Pairing advanced internal combustion engine technologies with high octane low carbon (HOLC) fuels would result in low-cost fuel economy and emissions benefits in the near term

Many of the emerging internal combustion engine technologies that are expected in the near term, including the ones with the highest expected penetration rates, could produce *greater* GHG and fuel economy benefits if paired with fuels offering higher octane ratings than what is typically available in the marketplace today.

Numerous studies by the automotive industry, DOE, and academia have examined the efficiency gains and emissions reductions that can be achieved when HOLC fuels are used in an internal combustion engine with high compression, turbocharging, and other advanced technologies. These studies have repeatedly shown that a high octane fuels (98-100 RON) used in high compression engines improves efficiency and reduces emissions by 4-10%, depending on drive cycle and other factors. Studies using a high octane mid-level ethanol blend also demonstrate that fuel economy and vehicle range using HOLC blends like E25 and E30 is equivalent or superior to performance using E10, even though the E25 and E30 blends have lower energy density.

IV. Ethanol’s unique properties make it an attractive candidate for boosting octane in future HOLC fuel blends

Certain chemical properties, such as “sensitivity” and heat of vaporization, make some octane boosters more attractive than others. As researchers have examined different methods of boosting gasoline octane ratings, one option—increased levels of ethanol—has stood out as the most efficient and economical pathway.

Not only does ethanol offer extremely high octane (109 RON, 91 MON), it also features high sensitivity and high heat of vaporization. These are attractive properties that, when considered along with ethanol’s lower “lifecycle” carbon intensity and lower cost relative to other octane options, make ethanol the clear choice for future HOLC fuels.

In addition to the tailpipe CO₂ reductions observed in several of the studies cited in these comments, ethanol-based HOLC fuels also offer important lifecycle GHG emissions benefits. That

⁸ U.S. Department of Energy. *Co-Optimization of Fuels & Engines for Tomorrow’s Energy-Efficient Vehicles*. Available at: <http://www.nrel.gov/docs/fv16osti/66146.pdf>

⁹ National Research Council, Committee on the Assessment of Technologies for Improving Fuel Economy of Light-Duty Vehicles. June 2015. *Cost, Effectiveness and Deployment of Fuel Economy Technologies for Light-Duty Vehicles*, at S-4.

is, the total “well-to-wheels” (WTW) emissions associated with producing and using ethanol are significantly lower per unit of energy delivered than the emissions resulting from petroleum production and use. The latest analysis conducted by DOE’s Argonne National Laboratory found that today’s corn ethanol reduces GHG emissions by an average of 34-44% compared to petroleum, while emerging cellulosic ethanol technologies offer GHG reductions of 88-108%.¹⁰ These benefits are compounded when the ethanol is used in a HOLC fuel that achieves greater fuel economy and vehicle range (i.e., more miles with less energy) than today’s marketplace fuels.

In a recent study, Argonne National Laboratory examined the WTW GHG emissions impacts of HOLC fuels (100 RON) containing 25% and 40% ethanol.¹¹ The analysis found that the inherent efficiencies resulting from using a high octane fuel in a high compression engine alone resulted in a 4-8% reduction in GHG emissions per mile compared to baseline E10 gasoline vehicles. Additional GHG reductions of 4-9% were realized as a result of corn ethanol’s lower lifecycle emissions upstream, meaning total GHG emissions per mile were 8% and 17% lower for E25 and E40, respectively, compared to baseline E10. Meanwhile, E25 and E40 HOLC blends made with cellulosic ethanol were shown to reduce total WTW GHG emissions by 16-31% per mile compared to E10. While high octane fuels using petroleum-derived octane sources may provide similar tailpipe CO₂ reductions as ethanol-based HOLC fuels, they clearly do not offer the additional GHG reductions associated with ethanol’s full WTW lifecycle.

Additional studies show that using ethanol as the source of octane in future high octane fuels has the potential to significantly decrease petroleum refinery GHG emissions by reducing the energy intensity of the refining process.¹²

V. Increasing octane should not come at the expense of air quality, carbon emissions, or human health

The potential for significant environmental, economic, and public health benefits from introducing higher octane fuels is obvious. However, the transition to higher octane fuels must be accompanied by requirements that octane sources improve air quality, reduce carbon emissions, and protect public health. Without such protections, there is the potential that increasing gasoline octane could

¹⁰ Wang, M.; Han, J.; Dunn, J. B.; Cai, H.; Elgowainy, A. Well-to-wheels energy use and greenhouse gas emissions of ethanol from corn, sugarcane and cellulosic biomass for US use. *Environ. Res. Lett.* 2012, 7, 1–13, DOI: 10.1088/1748-9326/7/4/045905

¹¹ Oak Ridge National Laboratory. July 2016. *Summary of High-Octane, Mid-Level Ethanol Blends Study*. ORNL/TM-2016/42

¹² See “Refining Economics of U.S. Gasoline: Octane Ratings and Ethanol Content”, DS Hirshfeld, JA Kolb, JE Anderson, W Studzinski, and J Frusti. (2014) [dx.doi.org/10.1021/es5021668](https://doi.org/10.1021/es5021668) | *Environ. Sci. Technol.* 2014, 48, 11064-11071; and “Petroleum refinery greenhouse gas emission variation related to higher ethanol blends at different gasoline octane rating and pool volume levels”, V Kwasniewski, J Blieszner, and R Nelson, DOI: 10.1002/bbb.1612; *Biofuels, Bioprod. Bioref.* (2015)

result in unnecessary backsliding on criteria air pollutants, air toxics, and other harmful emissions linked to certain high-octane hydrocarbons. When it comes to air quality and human health, not all octane sources are created equal. Ethanol reduces criteria pollutants, and is the only source of octane that is truly renewable and results in a significant reduction in carbon. But much of the octane contribution in today's gasoline comes from petroleum-derived aromatic hydrocarbons such as benzene, toluene, and the C8 aromatics like xylene. Those sources of octane are far from benign.

The health impacts of aromatic hydrocarbons are well known. A 2015 study published in the *American Journal of Epidemiology* linked benzene found in traffic emissions to childhood leukemia. A 2012 study published by the University of California ties the risk of autism to toxics found in traffic pollution. And a 2015 study published in the *Journal of Environmental Health Perspectives* links microscopic toxic particles in car exhaust to heart disease. Aromatic hydrocarbons compose 20-50% of the non-methane hydrocarbons in urban air and are considered to be one of the major precursors to urban secondary organic aerosols (SOA). SOA is a form of fine particulate matter pollution (PM_{2.5}), which is widely viewed as the most lethal air pollutant in the U.S. today. Moreover, new evidence is confirming that particulate matter from gasoline exhaust is a major source of black carbon, which is thought to be a significant contributor to climate change.

To date, EPA has been relatively quiet on the growing health and environmental threat posed by increased aromatics in gasoline. Because increasingly stringent fuel economy and GHG standards will likely result in increased use of higher octane fuels, the EPA must take into consideration the ancillary health and climate impacts of the various octane sources, and assure that no backsliding can occur.

VI. Policy and Regulations Should Ensure a Level Playing Field and Fair Market Access for Future Vehicle and Fuel Technologies

While EVs will undoubtedly play an expanding role in the future of our transportation sector, it is imperative that energy, environmental, and transportation policies are designed in a manner that ensures a level playing field and fair market access for all future vehicle and fuel options.

Unfortunately, a number of current federal and state policies put ethanol and other biofuels at a severe disadvantage relative to EVs, even though ethanol has a proven track record as a low-cost solution for reducing GHGs and displacing petroleum imports.

For example, the federal CAFE/GHG program contains many hidden subsidies and benefits meant to stimulate growth in EVs, while at the same time discouraging vehicle technologies designed for high levels of biofuels, such as flex fuel vehicles. In its original 2017-2025 CAFE/GHG rule, EPA

finalized a GHG emissions compliance value of 0 for EVs, PHEVs (for the portion of operation that is electric), and fuel cell vehicles (FCVs). This implies that operating one of these vehicles results in no GHG emissions whatsoever, despite EPA/NHTSA's acknowledgement that "[d]epending on how the electricity and hydrogen fuels are produced, these fuels can have very high fuel production/distribution GHG emissions (for example, if coal is used with no GHG emissions control)..."¹³ Indeed, on a full lifecycle basis, production of average electricity for use in EVs and PHEVs actually can generate *more* GHG emissions per unit of energy delivered than petroleum.¹⁴

Under the 2017-2025 CAFE/GHG standards, EPA also established a "multiplier" for all EVs, PHEVs, and FCVs, which would allow each of these vehicles to "count" as more than one vehicle in the manufacturer's compliance calculation. The agencies' reasoning for offering such a multiplier is that these vehicles, in their view, offer "the potential for game-changing GHG emissions and oil savings in the long term." If EPA/NHTSA feel it is their role to encourage the production of vehicles that potentially reduce GHG emissions and oil consumption, then they should extend favorable treatment under the rules to *all* vehicles that offer such potential.

While we strongly agree with EPA/NHTSA that automakers should be encouraged to produce vehicles that "[r]educ[e] petroleum consumption to improve energy security", "save the U.S. money" and "[r]educe climate change impacts,"¹⁵ we believe incentives to stimulate the production of such vehicles should be constructed fairly and consistently.

In the CAFÉ/GHG program and other federal regulations, EVs are effectively treated as "zero emissions" vehicles, which is not only inaccurate but provides EVs with an unfair incentive. In order to accurately portray the GHG emissions impacts of various fuel/vehicle combinations when determining emissions compliance values, EPA/NHTSA should include upstream ("lifecycle") emissions that are *directly* related to the production and use of the fuel. This is particularly important for electricity because, as EPA/NHTSA acknowledge, "...there is currently no national program in place to reduce GHG emissions from electric powerplants."¹⁶

While the bulk of lifecycle emissions for liquid combustion fuels occur at the tailpipe (i.e., as hydrocarbons are combusted in the internal combustion engine), the bulk of direct lifecycle

¹³ 76 Fed. Reg. 75,011 (December 1, 2011)

¹⁴ Lifecycle analysis conducted by the California Air Resources Board for the Low Carbon Fuels Standard found the well-to-wheels GHG emissions associated with "California average electricity" are 124.1 grams of CO₂-equivalent per mega joule (g/MJ), compared to 95.85 g/MJ for gasoline. In CARB's analysis, electric vehicles offer GHG savings relative to gasoline only after "Energy Economy Ratios" are applied to EVs and PHEVs to account for energy efficiency differences between electric drivetrains and internal combustion engines.
http://www.arb.ca.gov/fuels/lcfs/022709lcfs_elec.pdf

¹⁵ 76 Fed. Reg. 75,164-75,165 (December 1, 2011)

¹⁶ 76 Fed. Reg. 75,011 (December 1, 2011)

emissions for EVs and the electric operation portion of PHEVs occur upstream and are associated with the production of electricity. For biofuels, the bulk of net lifecycle emissions also occur upstream during biomass production and conversion, as the principles of lifecycle accounting hold that biogenic CO₂ emissions at the tailpipe are equivalently offset by the CO₂ that was removed from the atmosphere by the biofuel feedstock during growth. Basing compliance values on full *direct* well-to-wheels lifecycle emissions would allow for “apples-to-apples” treatment of the GHG emissions associated with different fuel/vehicle options, whereas the use of tailpipe-only emissions provides only a partial picture of the GHG impacts of various platforms. Impartial GHG accounting misrepresents the true climate impacts of the CAFE/GHG program.

In addition to the unfair benefits and incentives for the production of EVs embedded in the CAFE/GHG program, EVs benefit from a bevy of federal, state, and local subsidies and incentives. These include generous tax credits for consumer purchases of EVs, subsidies and incentives for producers of EVs, subsidization for expanding EV infrastructure, and other various benefits. One recent report found that the total cost of EV subsidies is substantial, with most of the financial benefit going to the wealthy.¹⁷ According to the study, the federal tax credit subsidizing consumer purchases of EVs “...could end up costing as much as \$15 to \$20 billion, while the cost of state subsidies could be as high as \$400 million to almost \$500 million.”

EVs will undoubtedly play a growing role in our transportation future, but we firmly believe all future fuels and vehicle technologies should compete on a level playing field that includes free and fair access to the marketplace.

VII. Biofuels and electrification can play complementary roles in the long-term future of our transportation sector, as important synergies exist between the two

While some suggest liquid fuels and electrification create an “either-or” dilemma for the future of our transportation sector, we believe ethanol and EVs can play complementary roles in the long term. Indeed, emerging technologies that utilize ethanol’s unique properties in hybrid electric technology, and even fuel-cell powered vehicles, demonstrate that low-carbon ethanol and electricity can be a winning solution to address future climate and energy security issues.

In 2016, Nissan unveiled the prototype of a vehicle powered by a solid oxide fuel cell that uses ethanol as the fuel. The Nissan “e-Bio Fuel Cell” prototype vehicle runs on 100% ethanol to charge a 24kWh battery that enables a cruising range of more than 600 kilometers.

¹⁷ Strata. October 2017. The Current State of Electric Vehicle Subsidies: Economic, Environmental, and Distributional Impacts. <https://strata.org/pdf/2017/ev-full.pdf>

And just last month, Toyota revealed its first prototype of a hybrid electric vehicle powered by a flexible fuel internal combustion engine that can run on any blend of ethanol and gasoline. According to news reports, Toyota plans to sell the flex fuel hybrid EV commercially by 2020. Ford has also experimented with ethanol flex fuel hybrid EV technology.

Unfortunately, both of these exciting new automotive technologies are being piloted in Brazil rather than the United States. However, in the long run, we believe these technologies have a future in the U.S. if smart policies are designed to establish a fuel-neutral framework that incentivizes desired performance rather than specific technologies.

VIII. In the near-term, existing fuel policies need to be implemented as designed to maximize renewable energy technologies.

This Committee deserves great credit for authoring the world's most aggressive and effective renewable energy policy – the Renewable Fuels Standard (RFS). By any measure, the RFS has been a success. It has lowered our dependence on imported gasoline and petroleum. It has lowered consumer gasoline prices. It has rejuvenated rural America with the single most important value-added market for farmers, allowing significant reductions in federal farm program costs. And it has reduced pollution in our nation's cities while reducing carbon from transportation fuels.

But EPA is currently undermining the program's effectiveness by systematically destructing biofuel demand at the expense of consumers demanding choice and savings at the pump and farmers facing economic peril as the cost of production increasingly exceeds market prices. The beneficiaries of EPA's demand destruction are highly profitable oil companies, many of whom have simply steadfastly refused to make the investments necessary for them to comply with the RFS cost-effectively.

In testimony before this Committee a week ago, EPA Administrator Pruitt acknowledged he has provided waivers to the RFS at an unprecedented rate. He did not, however, acknowledge how deeply these waivers have cut biofuel use. A review of EPA data by the RFA has demonstrated EPA's small refinery "hardship" waivers reduced 2016 RFS demand by 523 million gallons and 2017 RFS demand by an astounding 1.1 billion gallons!

There is simply no justification for EPA to have eviscerated the RFS with more than a billion gallons of demand destruction. Hardship waivers were intended for refineries experiencing disproportionate economic hard as a consequence of the RFS, not because of economic factors unrelated to the RFS. Ethanol is priced lower than gasoline today. It is the lowest cost octane on the market. Blending more of a lower cost product creates an economic hardship for no one.

Beyond the completely unjustified "hardship" waivers being granted with no apparent demonstration of hardship being shown, EPA has further undermined the program by forgiving

329 million gallons in RFS obligation for a bankrupt refinery in Pennsylvania whose financial problems are rooted in its own failed business decisions, not the RFS. And the Agency's failure to as yet address a court-ordered remand of 500 million gallons of 2016 RFS obligations further reflects an inexplicable disregard for the statute, the President's support for the RFS, and consumers across this country who deserve savings at the pump.

EPA's attack on the RFS must end. The Agency should work toward demand creation by allowing the year-round use of higher ethanol blends and cease its demand destruction campaign.

IX. In the long-term, a level playing field will empower consumers to make wise choices for their transportation needs, including a variety of electric and renewable liquid motor fuel options.

Without a doubt tremendous advances have been made in the automotive industry, all of which are commendable. That said, recognizing these improvements, we must not overlook the advantage of the renewable fuels we have readily available today. These new technologies can be paired with today's renewable fuels while improving both cost and convenience for the consumer.

As discussed above, we believe there is potential for new technologies to be harmonized with renewable fuels in future vehicle technology. A global policy shift is taking place driving transportation towards low-carbon technologies. We see that here in the U.S. in states such as California and it is accelerating worldwide. Renewable fuels have a key role to play in the development of new mobility. We believe a combination of technologies with ethanol could be the answer, so long as there is a level playing field. Together we can work together to increase efficiencies and reduce costs for consumers. It does not have to be one or the other.

Thank you for your time and interest in this matter of mutual consideration. I look forward to your questions.

Mr. SHIMKUS. Thank you.

The chair now recognizes Geisha Williams, President and CEO of Pacific Gas and Electric Company, on behalf of the Edison Electric Institute. You are recognized for 5 minutes. Welcome.

STATEMENT OF GEISHA WILLIAMS

Ms. WILLIAMS. Thank you, Chairman Shimkus. Thank you, Ranking Member Tonko, for the opportunity to speak before your committee this morning. It is on, yes. I will make it up a little bit closer, all right.

I am Geisha Williams, CEO and President of PG&E Corporation, the parent company of Pacific Gas and Electric. Pacific Gas and Electric is the largest combined electric and natural gas energy company in California. PG&E is here today as a member of the Edison Electric Institute. Together, EEI's member companies provide power to 220 million Americans across all 50 states.

We are also active and committed partners in the drive to grow America's electric transportation sector. As such, we applaud your focus on the policy implications of a transportation future in which electric vehicles will represent a growing share of the vehicles on our roads. Let me say clearly, we see electric transportation as a vital opportunity. It is an opportunity to make more efficient and economic use of our nation's incredible energy grid infrastructure and to help keep costs reasonable and affordable to all Americans. But it is also an opportunity for the U.S. to cement itself as a leader in transportation innovation. It is an opportunity to spur new investment and create jobs. And it is an opportunity to make our environment more sustainable through improved air quality and through lower greenhouse gas emissions.

Electric transportation technology and infrastructure are going to be one of the keys to making our cities smarter and more liveable. In our home state in California, for example, the transportation sector contributes 40 percent of the greenhouse gas emissions, 80 percent of NOx emissions and 90 percent of diesel particulate matter pollution. Because of the progress we are seeing in clean energy, and specifically in California, electrifying the transportation sector offers a chance to dramatically reduce each of these numbers. Consider in 2016, the electric industry CO₂ emissions were nearly 25 percent below the 2005 levels and for the first time in over 40 years they were lower than emissions from the transportation sector.

EEI member companies including PG&E are already helping to turn these opportunities into a reality in an efficient and cost effective way that benefits everyone. And let me briefly touch on a few examples. One is access to public charging infrastructure. A study by EEI and the Institute for Electric Innovation projects that by 2025 there will be seven million electric vehicles on the road in the United States and they will require nearly five million charging stations. More than a dozen EEI companies are stepping up and helping with this challenge with plans to invest \$350 million in customer programs and projects.

PG&E alone, my company, is investing \$130 million over the next 3 years to put 7,500 chargers at workplaces, at multifamily residences, and in disadvantaged communities. This will roughly

double the number of public charging facilities in our service area. And we hope to soon launch an additional \$230 million project of similar investments for medium and heavy duty vehicles. We are also growing EV into the grid. One key to this is managing the timing of charging. Our companies are approaching this in multiple ways including customer education, rate design, and smart charging which optimizes charging through communication between the grid, the vehicle, and the charging equipment.

For the last several years, PG&E has partnered with BMW to successfully pilot wireless smart charging through vehicle telematics systems. We also offer special rates to EV owners that incentivize them to charge at certain times of the day which allows us to take advantage of times when there is excess energy available on the grid. For the customer it means they are able to charge their vehicles at the equivalent of a \$1.20 per gallon, a price we haven't seen at the pump in 20 years.

The last area I will touch on is the industry's work to accelerate EV adoption by fleet operators including our own companies. EEI companies have increased the number of EVs in their fleets by 43 percent just since 2015. We are helping others make this transition as well. At PG&E, for example, we are working with transit agencies in Stockton and San Jose to pilot advanced smart charging and energy storage technologies to more seamlessly integrate their electric bus fleet charging with our grid.

These few examples only scratch the surface of everything we are doing as an industry. The key point I want to leave you with is this. Our industry is a critical partner in America's transportation future. From a policy standpoint it is vital that we continue to look for opportunities to engage the power sector and leverage this amazing energy grid that we have in this effort. Our companies are unique in our scale, our reach, and our expertise and we are committed to partnering and making this opportunity in this area a reality for all. Thank you again for the opportunity.

[The prepared statement of Ms. Williams follows:]

Testimony

of

**Geisha J. Williams
Chief Executive Officer and President
PG&E Corporation**

On Behalf of the Edison Electric Institute

before the

**Committee on Energy and Commerce
Subcommittee on Environment**

of the

United States House of Representatives

on

**Hearing: “Sharing the Road: Policy
Implications of Electric and Conventional Vehicles
in the Years Ahead.”**

May 8, 2018

**Testimony for House Energy and Commerce Committee
Environment Subcommittee
“Sharing the Road: Policy Implications of Electric and Conventional Vehicles in the Years
Ahead”
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Chairman Shimkus, Ranking Member Tonko, and Members of the Subcommittee, thank you for inviting me today. My name is Geisha Williams, and I am the Chief Executive Officer and President of Pacific Gas and Electric Company (PG&E). I am testifying today on behalf of the Edison Electric Institute (EEI).

EEI's member companies provide electricity for 220 million Americans and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than 7 million jobs in communities across the United States or about 5 percent of all jobs in the country. The industry also contributes \$880 billion annually to U.S. GDP, or 5 percent of total GDP, and invests more than \$100 billion each year to make the energy grid stronger, cleaner, more dynamic, and more secure.

PG&E is California's largest energy provider, with a service area that is home to 16 million people and is one of the fastest growing markets in the country for electric vehicles (EVs). One out of every five EVs in the United States plugs into PG&E's system. In addition, the energy we deliver is among the cleanest in the nation: last year, nearly 80 percent of our electricity delivered was greenhouse gas-free, and 33 percent came from eligible renewable resources. We also operate one of the nation's largest fleets of clean-fuel vehicles.

The market for EVs in the United States is growing significantly, driven by a combination of forces, including technology improvements, changing customer preferences, declining costs, tighter fuel efficiency standards and environmental regulations, and evolving customer sustainability goals.

A joint study by EEI and the Institute for Electric Innovation projects by 2025 the number of electric vehicles on America's roads will grow from current levels of about 820,000 to 7 million, or roughly 3 percent of all registered passenger vehicles. Indeed, total EV sales for 2017 increased 26 percent compared to 2016. And, sales this year are continuing the momentum: First-quarter 2018 sales increased 32 percent compared to first-quarter 2017.¹

A greater variety of models, improved battery capacity and declining costs have made EVs increasingly attractive to consumers. EVs are less expensive to operate than gasoline vehicles. This is primarily due to fuel cost savings because electricity is less expensive than gasoline on an equivalent cost basis. It also reflects the fact that EV maintenance costs are generally lower than those for conventional-fuel vehicles.² Electric energy companies have helped raise customer awareness of these and other benefits of EVs through activities such as social media campaigns, community events, and ride-and-drives.

¹ EEI, *Electric Vehicle Sales: Facts & Figures*, April 2018. http://www.eei.org/issuesandpolicy/electrictransportation/Documents/EV_%20Sales%20Facts%20and%20Figures.pdf

² Union of Concerned Scientists, *Going from Pump to Plug (2017)* (November 2017), <https://www.ucsusa.org/clean-vehicles/electric-vehicles/ev-fuel-savings>

EVs have also become an important compliance solution for automakers as they work to meet Corporate Average Fuel Economy (CAFE) and greenhouse gas (GHG) tailpipe standards. Compliance with both standards is playing a role in driving continued automaker investment in—and availability of—EVs.

EEL member companies believe that continued growth in the EV segment will also drive important benefits above and beyond their cost-savings and environmental potential. In particular, the increased use of EVs represents an opportunity to more efficiently utilize the nation's energy grid. "Smart" or "managed" charging allows energy companies and consumers to take advantage of times when excess energy is available on the system. This increased utilization effectively lowers the average cost to serve for all customers.³

We also believe that leveraging our nation's electric grid to fuel EVs also represents an important national security opportunity. When EVs connect to the grid, they are 100 percent powered by North American energy sources, including natural gas, coal, nuclear, hydropower, wind and solar energy.

In today's testimony, I will highlight three critical areas in which our industry is now working to support and accelerate the growth in EVs. These include (1) investing in infrastructure to make charging more accessible, (2) working to seamlessly integrate the growing number of EVs into the electric grid, and (3) working to increase the use of EVs in fleet and off-road applications.

³ See, e.g., Energy Environmental Economics (E3), *California Transportation Electrification Assessment, Phase 2: Grid Impacts* (October 2014), http://www.caletc.com/wp-content/uploads/2016/08/CalETC_TEA_Phase_2_Final_10-23-14.pdf

Investing in Infrastructure

Electric companies are integral partners in the growth of electric transportation. The joint EEI and Institute for Electric Innovation study (mentioned above) estimates that serving the 7 million EVs that are expected to be on the road by 2025 will require nearly 5 million charging ports.⁴ Nevertheless, public charging infrastructure in many areas of the country has been slow to develop, creating one of the primary barriers to increased EV adoption.

While public and DC fast charging accounts for a relatively small share of overall EV charging, its availability helps to alleviate “range anxiety” concerns. Public charging also provides a solution for EV drivers who do not have dedicated parking. And, DC fast charging provides a solution for long-distance travel along major corridors.

Electric companies are focused on expanding access to EV charging infrastructure for all types of customers. In partnership with automakers, policymakers, and other stakeholders, we can fill in the gaps based on the unique geographic and market needs of their service territories. We understand that public and DC fast charging must be accessible and easy to use and must provide EV drivers with a consistent and positive charging experience. Critical elements include a

⁴ EEI and the Institute for Electric Innovation (IEI), *Plug-in Electric Vehicle Sales Forecast Through 2025 and the Charging Infrastructure Required* (June 2017), [http://www.edisonfoundation.net/iei/publications/Documents/IEI_EEI%20PEV%20Sales%20and%20Infrastructure%20thru%202025_FINAL%20\(2\).pdf](http://www.edisonfoundation.net/iei/publications/Documents/IEI_EEI%20PEV%20Sales%20and%20Infrastructure%20thru%202025_FINAL%20(2).pdf).

seamless charging network experience, including a simple payment system and open network and communication protocols to ensure flexibility and choice.

More than a dozen EEI member companies together are investing more than \$350 million in customer programs and projects to deploy charging infrastructure and to accelerate electric transportation. This is not just happening on the coasts; some of the most successful electric transportation programs led by electric companies are in states such as Missouri and Utah.

In 2015, Kansas City Power & Light (KCP&L) began building out a Clean Charge Network of more than 1,000 charging stations throughout its service territory in Missouri and Kansas. KCP&L also paired the charging network with an extensive education and outreach campaign that included working with automakers and local dealerships to help educate drivers about EVs. The experience provides a real-world example of “build it and they will come.” Kansas City has become one of the fastest growing EV cities in the country, with the number of drivers using the network increasing 74 percent last year.

Rocky Mountain Power in Utah is another great example. In 2016, Utah enacted legislation allowing the company to create an EV charging infrastructure incentive program—similar to energy efficiency programs that electric energy companies have implemented successfully around the country. Rocky Mountain Power also leveraged a U.S. Department of Energy grant to help build DC fast charging stations along major travel corridors. These efforts are allowing the company to serve customers in new ways. Already, the company has announced a partnership

with Uber and Lyft to grow EV usage in ride-sharing applications, utilizing charging infrastructure that the company is helping to build.

At my company, PG&E, this year we launched our EV Charge Network program, investing \$130 million over the next three years to help customers install 7,500 chargers at workplaces and multi-family residences – roughly doubling the number of public level-two chargers available in our service area. Pending approval from our regulators, we hope to soon launch another \$230 million in investments for public fast charging and customer fleet charging infrastructure.

Electric companies also play an essential role in siting certain types of charging infrastructure where the energy grid has the capacity to support it and in helping customers to understand the cost implications for new installations. It is important that charging infrastructure developers and fleet operators work closely with electric companies as partners on charging project implementation. For example, as more high-powered DC fast chargers are deployed, and as fleet owners seek to charge multiple vehicles at single locations, the capacity of the energy grid at that location is an important consideration.

Integrating Vehicles with the Grid

As the EV market grows and the energy grid increasingly powers transportation, electric companies are critical to ensuring that EV charging is integrated with the energy grid in an efficient manner and that siting of certain types of charging infrastructure takes into account both

customer needs and energy grid capacity. That means minimizing costs, improving reliability, and meeting customer needs. Electric companies are taking a number of actions in this regard.

In particular, programs that encourage charging to occur when the energy grid has available capacity are crucial. Electric company programs that encourage charging to occur when the energy grid has available capacity will both minimize costs and help the grid operate more efficiently.

For example, electric companies can send price signals to encourage customers to charge their EVs at night to increase energy grid utilization or, in states with excess wind generation such as Texas, to increase wind energy utilization. PG&E's special electric rates for EV owners allow them to refuel in their garage overnight at the equivalent of \$1.20 per gallon, a price we haven't seen for gasoline since 1998.⁵ In states with excess solar energy generation, such as my state of California, electric companies can send price signals to encourage EV charging during the day to increase solar energy utilization.⁶ In fact, we are planning to soon extend our off-peak charging rates through the middle of the day. This effectively lowers the average system cost for *all* electric customers.

Supporting Increased Use of EVs in Fleet and Off-Road Applications

⁵ U.S. Energy Information Administration, *California All Grades Reformulated Retail Gasoline Prices (April 2018)*, https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMM_EPM0R_PTE_SCA_DPG&f=A

⁶ The flexibility of EVs to charge at different times, locations, and power levels can lead to a more efficient use of the energy grid, providing benefits to all customers. EV charging can be managed in multiple ways, including customer education, rate design, and "smart charging" that enables communication among the energy grid, the EV, and/or the charging equipment. Electric companies currently are testing multiple charge management strategies, including those that complement approaches used to integrate renewable and distributed energy resources.

A major opportunity to expand EV adoption is greater use of EVs in fleet and off-road applications. Electric transit buses have become increasingly popular as transit agencies recognize the fuel-cost savings of running buses on electric power. Electric-powered medium- and heavy-duty trucks also are coming to market. And, automakers and technology companies are testing autonomous vehicles today, while pairing the technology with electric powertrains.

For example, Portland General Electric is installing electric bus charging stations, allowing the city to electrify an entire bus route. My company, PG&E, is working with the cities of Stockton and San Jose to help them achieve their goal to fully electrify their transit bus fleets. These transit agencies will soon be piloting advanced smart-charging and energy storage technologies to more seamlessly integrate their electric bus fleet charging with our grid, reducing costs.

In addition, electric companies are collaborating with corporate customers that want to electrify their fleets to meet carbon commitments. San Diego Gas & Electric's pilot with UPS to support electric delivery trucks is a prime example.

Electric vehicles are also increasingly suited for off-road applications at airports and port facilities to reduce emissions, reduce costs, and improve productivity. Georgia Power, for example, supported the electrification efforts at the Port of Savannah and ground support equipment at Atlanta's Hartsfield-Jackson airport.

Finally, we believe in leading by example. More than 70 electric companies invested more than \$120 million in EVs for their own fleets in 2017 alone. In addition, they have increased the number of EVs in their fleets by 43 percent since 2015.

Similarly, electric companies also are incenting their employees to purchase EVs and are providing educational activities to increase awareness in the communities where they live. PG&E, for example, offers many of our employees workplace charging. We have nearly 1,000 employees who drive electric, and we've worked with automakers to offer special purchase incentives to our customers, too.

Essential Partners in America's Transportation Future

The nation's energy sector is in the midst of a profound transformation. Our industry is making unprecedented investments in smarter energy infrastructure, providing even cleaner energy, and expanding the choices and energy solutions available to meet the changing needs of our customers. Electrifying the nation's transportation sector is an opportunity to leverage this progress to achieve extraordinary benefits for all Americans in the decades ahead.

Our companies are essential partners in this effort and in building a smart, sustainable transportation future for our country. We are fully committed to working together with policymakers, customers and all stakeholders to make this opportunity a reality.

Thank you again for having me here today. I look forward to your questions.

Mr. SHIMKUS. Thank you very much.

The chair now recognizes Mr. Frank Macchiarola, Group Director, Downstream and Industry Operations for the American Petroleum Institute. Welcome.

STATEMENT OF FRANK MACCHIAROLA

Mr. MACCHIAROLA. Good morning. Chairman Shimkus, Ranking Member Tonko, and members of the subcommittee. Thank you for the opportunity to testify today. My name is Frank Macchiarola and I am group director of Downstream and Industry Operations at the American Petroleum Institute.

The subject of this hearing is important as it raises policy questions affecting our nation's economic strength, energy security, and environmental stewardship while presenting core questions about our everyday mobility. The internal combustion engine is the backbone of our transportation system and instituting significant changes to that system presents complex issues that must be approached with substantial caution.

The fuel supply chain is highly integrated with the transportation sector therefore we encourage the development and evaluation of transportation policy through a holistic systems-based approach in which vehicles, fuels, and infrastructure are treated as an integrated system. A strong oil and gas industry is a vital component of this integrated system and it is essential for our standard of living. The oil and gas industry supports approximately 10.3 million American jobs and nearly 8 percent of the U.S. economy. The industry also provides more than 98 percent of the fuels we use to conduct commerce, to travel for work and vacation, and to stay connected to our family and friends.

America's energy renaissance has allowed us to produce significantly more of the energy we use today and to help the United States become a net exporter of gasoline and diesel. At the same time, the United States has reduced air pollution by 73 percent between 1970 and 2016, even as vehicle miles traveled nearly tripled and the economy grew during that period by 253 percent. EIA estimates that liquid fuels will continue to be the primary transportation source through the next two decades. The fuels we use must be reliable and affordable and fully compatible with engines, motor vehicles, and fuel distribution systems and we must enact transportation and energy policy based on free market principles providing consumer choice and greater certainty for market participants.

One policy that distorts free market, conflicts with integrated approach, and places a burden on the consumer is the Renewable Fuel Standard. It is an example of the government placing its finger on the scales to benefit one industry over another. To be clear, API believes we need all sources of commercially viable energy including renewables. However, the statutory requirements of the RFS are unworkable and unattainable. At the time of the RFS passage in 2007, EIA significantly overestimated today's gasoline consumption by 12 percent, substantially underestimating oil and gas resources by 70 percent. Furthermore, EIA assumed in 2007 that we would see a technological breakthrough in production of advanced and cellulosic biofuels. These fuels have failed to be produced in meaningful and commercial volumes.

We need to sunset the outdated RFS and we appreciate the leadership of the chairman and members of this subcommittee in analyzing potential solutions for comprehensive reform. As we look at fuels policies including those addressing electric vehicles the RFS should stand as a cautionary tale to policymakers. Electric vehicles show some promise in certain applications and many forecasters expect market-driven growth in the production and use. While API supports market-driven activity, we oppose government intervention in the markets to pick winners and losers as that creates an unlevel playing field.

In enacting transportation policy we must acknowledge that vehicles are staying on the road longer and going further on the fuels we use. New transportation policies that incentivize shifts in consumer behavior should be considered with caution as they could impose undue costs on consumers with diminishing environmental benefits. The ultimate trajectory and level of market penetration achieved by EVs should not rely on government interference but rather the free market. It should depend on consumer acceptance and on the relative energy and environmental performance of existing conventional automotive technologies.

The oil and gas industry is committed to providing for our nation's essential energy needs in the years ahead and we look forward to working with the Congress on solutions to support the American consumer. I thank the chairman, ranking members, and members of the subcommittee for the opportunity to testify today and I look forward to your questions. Thank you.

[The prepared statement of Mr. Macchiarola follows:]



Testimony of Frank J. Macchiarola, Group Director, Downstream and Industry
Operations, American Petroleum Institute

U.S. House of Representatives, Energy and Commerce Subcommittee on the
Environment

May 8, 2018

Chairman Shimkus, Ranking Member Tonko and members of the Subcommittee, thank you for the opportunity to testify today. My name is Frank Macchiarola, and I am Group Director of Downstream and Industry Operations at the American Petroleum Institute (API). API is the national trade association representing all aspects of America's oil and natural gas industry. Our 620 corporate members - from large integrated oil and gas companies to small independent companies - comprise all segments of the industry. API member companies are producers, refiners, suppliers, retailers, pipeline operators and marine transporters as well as service and supply companies providing much of the nation's energy.

The subject of today's hearing "Sharing the Road: Policy Implications of Electric and Conventional Vehicles in the Years Ahead" is an important one as it raises policy questions that impact our nation's economic strength, energy security and environmental stewardship while also presenting core questions about mobility in our everyday lives.

A strong oil and gas industry is essential to the vitality of our U.S. transportation sector and to our nation's standard of living. More than 98% of vehicles on the road use oil and gas industry fuels, providing people the ability to conduct commerce, get to their jobs and go on vacations. And today, this is done with cleaner fuels that allow automobile manufacturers to build engines that reduce emissions. Furthermore, the energy renaissance in U.S. oil and gas development from unconventional shale resources has created greater energy security. And with Congress' leadership, the end to the crude oil export ban has also helped to favorably reshape America's energy security posture. Additionally, increased refining capacity has contributed to the United



States becoming a net gasoline and diesel exporter.¹ This energy renaissance has driven economic growth in areas across the country. The oil and gas industry now supports approximately 10.3 million American jobs and nearly 8 percent of the U.S. economy.

Looking ahead, recent forecasts of long-term energy trends, such as those prepared by the U.S. Energy Information Administration², ExxonMobil³ and BP⁴ indicate that despite projections of strong growth in the electric vehicle fleet, liquid fuels consumption - principally driven by abundant supplies of petroleum and natural gas - will continue to be the primary transportation energy source through the next two decades.

In order to drive our nation's economic growth as well as ensure a stable and secure energy future, we must adopt transportation and energy policies based on free-market principles that allow market participants to operate and compete on a level playing field. API opposes mandates and subsidies, as they distort the free market and ultimately increase consumer costs. Energy policies should provide for consumer choice and allow the free market to determine the mix of required energy sources. Additionally, Americans and the nation's economy depend on reliable and affordable transportation fuels that are fully compatible with engines, motor vehicles, and the fuel distribution infrastructure.

The internal combustion engine is the backbone of the U.S. transportation system and significant, systemic changes would be extraordinarily complex and must be approached with substantial caution. The fuel supply chain annually distributes more than 140 billion gallons of gasoline and 60 billion gallons of diesel, jet fuel, and home heating oil from refinery gates to consumers at retail. This fuel infrastructure and the transportation sector are highly integrated as consumers purchase roughly 16.9 to 17.8 million new light-duty vehicles, annually in the U.S.⁵ and sustain a total domestic fleet of approximately 250 million light-duty vehicles⁶, which rely on petroleum fuel. Recent data shows that the average age of the vehicle fleet is increasing which suggests that Americans are maintaining their vehicles longer⁷, underscoring the need to recognize the long-term implications of changes to transportation policy.

¹ <https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MTPEXUS2&f=A>

² U.S. Energy Information Administration, *Annual Energy Outlook 2018*

³ ExxonMobil, *2018 Outlook for Energy*

⁴ BP, *BP Energy Outlook*

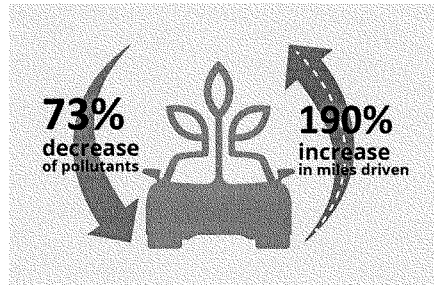
⁵ <https://ihsmarkit.com/research-analysis/US-light-vehicle-sales-rise.html>

⁶ U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2016*, Table VM-1, December 2017

⁷ IHS Automotive/R. L. Polk Annual Press Releases. Release *November 22, 2016*.



The environmental progress made in the refining of fuels and improvements in vehicles is undeniable. Cleaner fuels used in today's more efficient vehicles are helping reduce pollutants in tailpipe emissions. According to the EPA, overall new cars, trucks, SUVs and heavy-duty trucks and buses run about 99 percent cleaner than models produced in 1970.



This progress has helped reduce U.S. air pollution by 73 percent between 1970 and 2016, even as vehicle miles traveled nearly tripled and the economy grew 253 percent.⁸

As policymakers consider ways to build on our nation's success in strengthening America's energy security, API encourages development and evaluation of transportation policy on a holistic basis in which vehicles, fuels and infrastructure are treated as an integrated system. Indeed, the use of a systems approach has guided API during our more than 75-years of collaboration with the automobile industry under the auspices of the Coordinating Research Council (CRC) in order to study challenges of mutual interest related to fuels, lubricants and the equipment in which they are used.

Renewable Fuel Standard

One policy that distorts free markets, conflicts with a holistic, integrated approach and places a burden on energy consumers is the Renewable Fuel Standard (RFS). To be clear, API believes the United States needs all sources of commercially viable energy, and renewable resources will remain part of our energy mix. However, the statutory requirements of the RFS program are unworkable and unattainable. API supports significant and comprehensive reform that includes a sunset of the RFS.

Our primary RFS concern is the ethanol blendwall, the point at which the mandated volume of ethanol exceeds the ability of the vehicle fleet and distribution infrastructure to use the fuel. The Energy Independence and Security Act of 2007⁹ (EISA) set aggressive and aspirational targets for increasing renewable fuel consumption. As the mandate increases, the volume of ethanol required exceeds 10% of the gasoline market. Ethanol blended into gasoline at up to

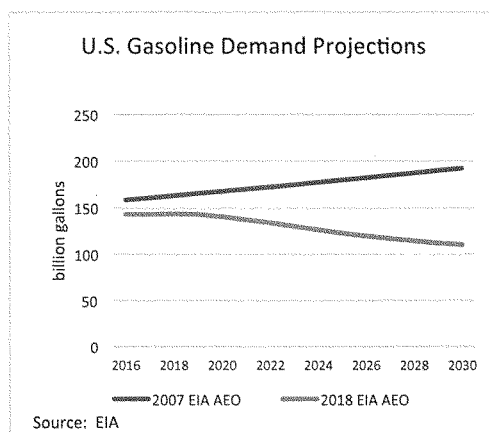
⁸ API State of American Energy 2018

⁹ The Energy Independence and Security Act, Public Law 110-140 (2007).



10 volume percent is approved for usage in all light duty cars and trucks and fueling infrastructure. However, approximately 75% of the light-duty vehicles currently on the road are not certified or warranted for blends above 10%.¹⁰

The energy landscape has changed significantly in the years since the RFS was enacted. Over the past decade, marketplace and technological realities have developed in ways that render RFS policies outdated. At the time that the EISA legislation was enacted, the Department of Energy (DOE) was forecasting¹¹ an increasing growth in gasoline consumption and the volumes exceeded that which could absorb 15 billion gallons of ethanol blended as E10. However, the 2007 Annual Energy Outlook



forecast substantially overestimated long-term gasoline consumption. According to the latest DOE forecast¹², gasoline consumption in 2018 will be 12% lower than 2007 projections, and by 2030 gasoline demand will be 42% lower than the projections made in 2007.

In 2007, the DOE projections also showed that domestic oil supplies would be insufficient to meet the forecasted growth in demand and would result in increasing reliance on oil imports. As a result of technological advances, such as horizontal drilling and hydraulic fracturing, crude oil and natural gas resources are over 70% higher than projections made in 2007.¹³

It was further assumed in EISA that a technological breakthrough in the production of advanced and cellulosic biofuels would provide significant reductions in greenhouse gas emissions from biofuels. These fuels have not been produced in commercial volumes, and conventional ethanol and biodiesel remain the predominant biofuels used to meet the RFS mandate.

¹⁰ <http://www.edmunds.com/ownership/howto/articles/120189/article.html>

¹¹ EIA 2007 Annual Energy Outlook.

¹² EIA 2018 Annual Energy Outlook

¹³ API analysis of EIA data: DOE/EIA-0554(2007) released April 2008 and <https://www.eia.gov/outlooks/aeo/assumptions/pdf/oilgas.pdf>



Despite the outdated and invalid assumptions made at the inception of the program, the RFS continues to be administered in a manner that pushes the limits of the ethanol blendwall to maximize renewable fuel volumes in the transportation fuel supply. Because of incompatibility concerns with vehicle and distribution infrastructure, and a lack of consumer demand, higher ethanol blends like E15 and E85 are not solutions to the ethanol blendwall problem. NERA Economic Consulting analyzed the RFS in 2015¹⁴ and determined that the RFS statutory targets are infeasible and, if implemented, would result in significant harm to the U.S. economy. Although the blendwall has been a binding constraint on the fuel supply system, severe negative economic consequences have been mostly averted in the short term by compliance flexibilities of the program. Namely, EPA has used its waiver authority on an annual basis. Additionally, on an aggregated basis, obligated parties accumulated carryover credits (RINs)¹⁵ early in the program when required volumes were below the blendwall constraint. These compliance mechanisms serve to further the implementation of the RFS program, but more importantly they demonstrate that the program is unworkable and needs significant reform.

API appreciates the leadership of the Chairman and members of this Subcommittee in your approach to comprehensive fuels reform responsive to the concerns of market participants, especially the American consumer. In order to achieve the goals we have stated for an effective fuels policy, any comprehensive policy measure must include a sunset of the RFS program. Additionally, we believe that the prospect of a higher-octane gasoline is an idea worthy of additional study to analyze the potential costs and benefits to all market participants throughout the value chain, including the consuming public, as well as to our nation's energy security and environment.

Electric Vehicles

Some commentators refer to electric vehicles (EVs) as "zero-emission" vehicles. EVs may better be described as "emissions displacement" vehicles. The "zero-emission" classification fails to acknowledge the energy required in manufacturing the vehicle and battery systems, the energy sources used to generate the electricity required to charge the vehicle, and the environmental cost of battery disposal.

¹⁴ NERA Economic Consulting, "Economic Impacts Resulting from Implementation of RFS2 Program", July, 2015.

¹⁵ Renewable Identification Numbers (RINs) are generated by biofuel producers and used by refiners and importers of transportation fuels to demonstrate compliance with the RFS program.



Electric vehicles show some promise in certain applications, and many forecasters expect market-driven growth in their production and use. While we support market-driven activity, API opposes government intervention in the markets to pick winners and losers because it creates an un-level playing field. Tax transfers from one sector should not be used to subsidize another, and tax policy should provide consistent treatment among industries. Subsidies such as federal and state income tax credits for the purchase of electric vehicles and tax credits for the installation of electric charging infrastructure distort free markets and are detrimental to taxpayers and the consuming public. In fact, electric vehicle incentive programs have had a “reverse Robin Hood” effect. According to a study done by University of California Berkeley faculty, clean energy “tax expenditures have gone predominantly to higher-income Americans... The most extreme is the program aimed at electric vehicles, where we find that the top income quintile has received about 90% of all credits.”¹⁶

Ambitious federal and state emissions and fuel economy requirements are encouraging automobile manufacturers to produce EVs in greater numbers. Sales forecasts of battery electric vehicles in the United States vary widely, ranging from 10% to about 54% by 2040¹⁷, up from approximately 1% of the market currently. The ultimate trajectory and level of market penetration achieved by electric vehicles should not rely on government interference in the free market. Rather, it should depend on continued (a) reductions in battery costs (which may require technology breakthroughs), (b) improvements in electric vehicle driving range, (c) expansion of the electric vehicle charging infrastructure and, ultimately consumer acceptance. The trajectory of EV adoption also depends, heavily, on the assumption that future improvements in EV technology will not be overtaken by unforeseen breakthroughs that may impact the relative energy and environmental performance of existing conventional automotive technologies.

We encourage the adoption of policies that strengthen our energy security, improve our standard of living and protect our environment. In creating transportation policy, Congress should acknowledge that consumers are purchasing vehicles today, and those vehicles are staying on the road longer¹⁸ and going further on a gallon of fuel. New transportation policies that incentivize shifts in consumer behavior should be considered with caution as they may impose undue costs on consumers with diminishing environmental benefits and unintended

¹⁶ “The Distributional Effects of U.S. Clean Energy Tax Credits,” by Severin Borenstein (UC Berkeley), and Lucas W. Davis (UC Berkeley), National Bureau of Economic Research, Cambridge, Massachusetts, July 2015

¹⁷ Bloomberg New Energy Finance, 6 July 2017, “Electric Vehicles to Accelerate to 54% If New Car Sales by 2040”

¹⁸ IHS Automotive/R. L. Polk Annual Press Releases. Release *November 22, 2016*.



consequences. As noted earlier, a strong oil and gas industry is essential to the vitality of America's transportation sector and our standard of living. The oil and gas industry is committed to providing for our nation's essential energy needs in the years ahead and we look forward to working with Congress on solutions that support the American consumer and strengthen our nation's economy, environment and energy security.

I thank the Chairman, Ranking Member and members of the Subcommittee for the opportunity to testify today and I look forward to your questions.

Mr. SHIMKUS. Thank you very much.

The chair now recognizes Dr. David Reichmuth, Senior Engineer, Clean Vehicles Program with the Union of Concerned Scientists. You are recognized for 5 minutes. Welcome.

STATEMENT OF DAVID REICHMUTH

Mr. REICHMUTH. Thank you. Good morning, Chairman Shimkus and Ranking Member Tonko and members of the committee. My name is Dr. David Reichmuth. I am a senior engineer with the Union of Concerned Scientists, a nonprofit advocacy organization whose primary mission is to ensure that policy is crafted based on the best available science. I would like to thank you for the invitation to talk to you today about the benefits of electric vehicles, or EVs.

The promises of EVs are clear. Drivers can save money, harmful emissions are reduced, and the use of petroleum can be minimized. Reducing emissions means public health benefits, economic benefits, and avoiding the worst impacts of climate change. Transportation is now the leading source of carbon dioxide emissions in the United States. Addressing the emissions from this sector is a critical piece in moving toward a more sustainable economy and way of life not just for the United States but worldwide.

Now switching fuels from petroleum to electricity can provide significant emissions reductions. My colleagues and I have compared the climate emissions from driving on electricity versus gasoline. To do so, we considered all the global warming emissions from driving on electricity versus gasoline and we considered all the emissions from fueling power plants, getting electricity to an EV and compared that to the emissions created extracting crude oil, refining gasoline, distribution to filling stations, and combustion in a vehicle's engine.

Our most recent analysis shows that cars driving on electricity in the U.S. have emissions equal to what a gasoline car that gets 80 miles per gallon would produce. It is true that emissions from EVs vary depending on where in the U.S. they are driven, as the emissions from electricity generation varies regionally. Overall, 75 percent of the people in the U.S. now live where driving on electricity is cleaner than a 50 mile per gallon gasoline car and these are figures for the average EV. More efficient EVs of course are even cleaner. Not only are EVs cleaner than gasoline cars, the gap is growing as electricity generation shifts away from dirtier fossil fuels to sustainable lower emission resources.

EVs also have air quality benefits when paired with clean sources of power. Studies have shown the potential for EVs to reduce ground level ozone and particulate matter in both urban and rural areas across the country. But EVs are not just cleaner than gasoline vehicles, they are cheaper to refuel and maintain. In a recent UCS analysis we compared the cost to refuel with gasoline with the cost to recharge an EV. Looking at the electricity providers in the 50 biggest U.S. cities, recharging an EV is cheaper than refueling the average new gasoline vehicle in every city. The average saving is almost \$800 per year on fuel costs.

In addition to lower fuel costs, EV drivers avoid unexpected shocks to their household budget from spiking gasoline prices and

face significantly lower maintenance costs. Battery electric vehicles have no engine so no oil changes, spark plugs, or engine air filter to change. Instead, electric motors and batteries require little to no attention. This means less time and less money spent on routine car maintenance.

Now EVs are an important tool to improve public health and economic vitality, but the EV market, the infrastructure, and the technology are still relatively new. It has been less than 8 years since the start of mainstream EVs in the United States and the ability of longer range, lower cost, battery electric vehicles really only started last year. So, while there is strong growth in EVs both in the number of models available and sales volume, it is far too early to end public sector investments in EVs and in needed infrastructure. Removing support prematurely will delay the adoption of EVs at a time we need to be doing exactly the opposite which is accelerating the transition to cleaner transportation.

Other countries around the world are moving to incentivize and require electric vehicles and manufacturers will need to respond in order to compete. Last year, four of the five top-selling EV models in the U.S. came off of American assembly lines. Making policy choices in the U.S. that inhibit the growth of EVs will place domestic car makers at risk of falling behind, hurt American drivers, and harm U.S. manufacturing. Now EVs are an important solution to improve air quality and reduce climate changing emissions. They allow U.S. drivers to use a cheaper fuel with lower variability in price. The EV market, it is young but it is growing and the investment that U.S. Government, the states, automakers, and utilities have made in EVs will pay dividends if we continue to have smart EV policies.

I would like to thank you for the invitation to share UCS's perspective on electric vehicles and I am happy to speak to those issues or anything else which is of interest to the committee. Thank you.

[The prepared statement of Mr. Reichmuth follows:]

**Sharing the Road: Policy Implications of Electric and Conventional Vehicles
in the Years Ahead - Testimony**

David Reichmuth Senior Engineer, Clean Vehicles Program Union of Concerned Scientists

Good morning, Chairman Shimkus and Ranking Member Tonko. My name is Dr. David Reichmuth and I am a Senior Engineer with the Union of Concerned Scientists, a non-profit advocacy organization whose primary mission is to ensure that policy is crafted based on the best available science.

Thank you for the invitation to talk to you about the benefits of electric vehicles or EVs. The promise of EVs are clear: drivers can save money, harmful emissions are reduced, and the use of petroleum can be minimized. Reducing emissions means public health benefits, economic benefits, and avoiding the worst impacts of climate change. Transportation is now the leading source of carbon dioxide emissions in the United States. Addressing the emissions from this sector is a critical piece in moving towards a more sustainable economy and way of life not for just the United States, but worldwide.

Switching fuels from petroleum to electricity can produce significant emissions reductions. My colleagues and I have compared the climate emissions from driving on electricity versus gasoline. To do so, we considered all of the global warming emissions from fueling power plants and getting electricity to an EV and compared that to the emissions created extracting crude oil, refining gasoline, distribution to filling stations, and combustion in a vehicle's engine.¹ Our most recent analysis shows that cars driving on electricity in the US have emissions equal to

¹ "Cleaner Cars from Cradle to Grave," R. Nealer, D. Reichmuth, and D. Anair. Union of Concerned Scientists, Cambridge, MA: 2015. <https://www.ucsusa.org/clean-vehicles/electric-vehicles/life-cycle-ev-emissions>

what a gasoline car that gets 80 MPG would produce.² It's true that emissions from EVs vary depending on where in the US they are driven, as the emissions from electricity generation varies regionally. For example, using data released earlier this year from the US Department of Energy and the EPA, charging on the grid that includes Oregon, the average EV has emissions equal to a car that gets 96 MPG, while in some of the best regions like California and upstate New York, an EV is better than a 100 MPG car. Overall, seventy-five percent of people in the US now live in places where driving on electricity is cleaner than a 50 MPG gasoline car. And these figures are for the average EV. The most efficient EVs are even cleaner, better than 80 MPG equivalent in areas like Texas and the Carolinas.

Not only are EVs cleaner than gasoline cars, the gap is growing as electricity generation shifts away from dirtier fossil fuels to sustainable, lower emission resources. From 2007 to 2017, coal generation dropped from nearly 50 percent to 30 percent of all power generation. At the same time, renewable sources (not including hydropower) like utility-scale solar and wind power have grown to make up almost 10 percent of US electricity generation.³ The result is that EVs are getting cleaner across America. And unlike gasoline cars, even used EVs get cleaner as the grid gets greener.

We also examined the difference in emissions between manufacturing an electric car and a similar gasoline-powered vehicle. Our results show that while there are slightly higher global warming emissions from producing an EV (due primarily to battery manufacturing), these emissions are dwarfed by the savings realized when driving on electricity instead of gasoline.

² "New Data Show Electric Vehicles Continue to Get Cleaner," D. Reichmuth. Union of Concerned Scientists Blog, 2018, <https://blog.ucsusa.org/dave-reichmuth/new-data-show-electric-vehicles-continue-to-get-cleaner>

³ This excludes hydropower. Renewable energy and hydropower combined to produce 17 percent of US electricity. <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3>

The emissions “debt” from EV manufacturing is repaid over the first 6-16 months of operation, depending the size of the EV’s battery (assuming the average US electricity grid). Also, auto companies have an opportunity to further reduce their emissions from manufacturing vehicles through using renewable electricity to power their factories. For example, Tesla is installing a large rooftop solar installation to power its growing battery manufacturing facility in Nevada.

EVs also have air quality benefits when paired with clean sources of power. A study by the Electric Power Research Institute and the Natural Resources Defense Council showed the potential to for EVs to reduce ground-level ozone and particulate matter in both urban and rural areas across the country.⁴

But EVs are not just cleaner than gasoline vehicles, they are also cheaper to refuel and maintain. In a recent UCS analysis, we compared the cost to refuel with gasoline to the cost to recharge an EV.⁵ Looking at the electricity providers in the 50 biggest US cities, recharging an EV is cheaper than a refueling with gasoline in every city. Compared to the average new gasoline vehicle, driving an EV would save on average almost \$800 per year on fuel costs. In addition to lower fuel costs, the price of residential electricity is much less volatile than gasoline prices. EV drivers can enjoy lower fuel spending and avoid unexpected shocks to their household budgets from spiking gasoline prices. Drivers of battery electric vehicles also can have significantly lower maintenance costs. These cars have no engine, so no oil changes, spark plugs, or engine air filter to change. Instead, the electric motors and batteries require little to no attention. This means less time and money spent on routine car maintenance. Comparing the

⁴ “Environmental Assessment of a Full Electric Transportation Portfolio,” EPRI, Palo Alto, CA: 2015.
<https://www.epri.com/#/pages/product/3002006881/>

⁵ “Going from Pump to Plug,” D. Reichmuth, Union of Concerned Scientists, Cambridge, MA: 2017.
<https://www.ucsusa.org/clean-vehicles/electric-vehicles/ev-fuel-savings>

Chevy Bolt EV to the Chevy Sonic gasoline car, the Bolt owner will spend over \$1,500 less on scheduled maintenance over the first 150,000 miles. An American Automobile Association (AAA) study found that electric vehicles have the lowest annual maintenance and repair costs of any vehicle class examined.⁶

It is important to note that while EVs are a solution to reducing emissions and petroleum use, the national fuel economy and emissions standards do not require automakers to produce electric vehicles. On the contrary, automakers can meet the current standards through 2025 primarily by improving gasoline-powered vehicles using technologies like lighter and stronger materials, smaller but more powerful turbocharged engines, and more efficient transmissions. Biofuels, more efficient gasoline cars, and electric drive vehicles all can be and need to be part of the solution to reduce emissions. These tools to clean up transportation are not in conflict with each other. Many of the cars and trucks on new car dealer's lots over the next decade will be gasoline-powered, so making those vehicles as efficient as possible is important.

EVs are an important tool to improve public health and economic vitality, but the EV market, infrastructure, and technologies are still relatively new. It has been less than eight years since the Chevy Volt and Nissan LEAF began sales in the US, marking the start of mainstream EVs in the US. And the availability of long-range, lower-cost battery electric vehicles only started last year. So, while there is strong growth in EVs – both in the number of models available and sales volume – it is far too early to end public-sector investments in EVs and needed infrastructure. Removing support prematurely will delay the adoption of EVs, at a time where we need to be doing exactly the opposite, accelerating the transition to cleaner

⁶ "Your Driving Costs." American Automobile Association, Orlando, FL: 2017
<https://newsroom.aaa.com/auto/your-driving-costs/>

transportation. Other countries around the world are moving to incentivize and require electric vehicles, and manufacturers will need to respond in order to compete. Last year, 4 of the 5 top-selling EV models in the US came off of American assembly lines. Making policy choices in the US that inhibit the growth of EVs will place domestic carmakers at risk of falling behind, hurt American drivers, and harm US manufacturing.

EVs are an important solution to improve air quality and reduce climate-changing emissions. They also allow US drivers to use a cheaper fuel with lower variability in price. The EV market is young but is growing. The investments that the US government, states, automakers, and utilities have made in EVs will pay dividends if we continue to have smart EV policies.

Thank you for the invitation to share UCS's perspective on electric vehicles and I am happy to speak to those issues or anything else of which is of interest to the committee.

Mr. SHIMKUS. Thank you very much.

And finally, last but not least, Mr. Dylan Remley, Senior Vice President, Global Partners, on behalf of the National Association of Convenience Stores and Society of Independent Gasoline Marketers of America. Sir, you are recognized for 5 minutes. Welcome.

STATEMENT OF DYLAN REMLEY

Mr. REMLEY. Chairman Shimkus, Ranking Member Tonko, members of the subcommittee, thank you for the opportunity to testify today on the future policy implications of electric and conventional vehicles. My name is Dylan Remley. I am Senior Vice President of Terminal Operations for Global Partners. Global has one of the largest terminal networks in the Northeast and we are also one of the largest independent owners, suppliers, and operators of gasoline stations in the Northeast with approximately 1,450 locations, 260 of which we directly operate. I am testifying today on behalf of the National Association of Convenience Stores and the Society of Independent Gasoline Marketers of America.

Members of NACS and SIGMA, collectively, account for approximately 80 percent of retail motor fuel sales in the United States. Fuel retailers are consumer-facing entities that must adapt to changing consumer demands and to do so we must change the products and services we offer to the general public. We have chosen our retail locations with care. We constantly strive to provide the best possible refueling services to consumers. For example, Global itself has recently partnered with Electrify America to install EV charging stations in some of our stores and we are also exploring a number of other options with EV providers to meet the ever-changing needs of our customer base.

However, as more electric vehicles continue to share the road with conventional vehicles in the years ahead, we urge policymakers to consider several factors including the environmental and energy independence implications of this shift, the impact on marketplace competition, and then the impact on the Nation's infrastructure. Lawmakers must examine the well-to-wheels cost and impact of EVs from power plant energy distribution to battery disposal. How will batteries be ultimately recycled and then disposed of if it cannot be recycled? Moving forward now and figuring out not only this issue but a host of others at a later date does not work.

It is also important for lawmakers to consider energy security and independence questions. Our nation has made significant strides to achieve energy independence and security. We should question the implications of a transition to electricity-powered vehicles that will come at a significant cost in the form of new infrastructure and will rely on the importation of certain raw materials from countries that may not be considered politically or economically stable. However, today, what we would most like to emphasize is that policymakers must consider the current skewed incentives that exist for EVs that may lead to an anticompetitive refueling marketplace.

Many states effectively grant utility companies a monopoly over the provision of electricity in a particular marketplace and utility companies are guaranteed a rate of return from their ratepayers.

Recently, utility companies have sought approval to enter the EV recharging business and treat their capital investments in that business as part of the utility rate base that all of their customers must pay. The private sector will have significant difficulty competing with zero market entry costs. It is inappropriate for utility companies and states to be regressively funding electric recharging infrastructure on the backs of ratepayers, the vast majority of whom do not even drive EVs.

I want to be very clear. Fuel retailers do not have a problem with a public utility entry in the electric fuel recharging business provided it is competing for that business on equal footing with the private sector. A public utility company should not be able to invest in electric or alternative fuel recharging infrastructure by using ratepayer funds which the private sector simply cannot compete with.

Infrastructure concerns including updating the power grid and the cost of maintaining the Nation's roads and bridges must also be evaluated. Unlike conventional vehicles which support infrastructure investments because their owners pay the gas tax, current EV owners use the country's roads essentially for free. Lawmakers should ensure the EV recharging and infrastructure investment is done through the private sector on a level playing field so that tax and other incentives are not provided to certain stakeholders to the omission of others.

Finally, given the prime location of retail fueling stores, the highly competitive nature of our industry, and a wealth of experience in refueling, we believe that the fuel retailing industry is well-positioned to meet consumer needs as EVs continue to enter the marketplace. We encourage Congress and the states to work with industry and other stakeholders to find ways to deploy electric charging infrastructure via the existing privately developed motor fuel marketplace. Thank you for the opportunity to testify and I am happy to answer any questions.

[The prepared statement of Mr. Remley follows:]

Statement of
Dylan K. Remley
Senior Vice President, Terminal Operations
Global Partners LP,
Waltham, Massachusetts

On Behalf of the
National Association of Convenience Stores (NACS)
And the
Society of Independent Gasoline Marketers of America (SIGMA)

Before the
U.S. House Committee on Energy and Commerce,
Subcommittee on Environment
May 8, 2018

Hearing on
“Sharing the Road: Policy Implications of Electric and
Conventional Vehicles in the Years Ahead.”

I. SUMMARY OF TESTIMONY

- Global Partners LP and other fuel retailers are consumer-facing entities that must continually adapt to changing consumer demands—and meeting those demands necessitates constantly changing the products and services they offer to the general public.
- As more electric vehicles continue to share the road with conventional vehicles in the years ahead, policymakers must consider several factors, including: (1) the environmental and energy independence implications of this shift, (2) the impact on marketplace competition, and (3) the impact on the nation's infrastructure.
- Policymakers should consider the overall impact of transitioning a substantial portion of the automobile fleet to electric vehicles as well as the impact on energy security and independence. This includes examining the “well to wheels” cost and impact of electric vehicles, taking into account power plant energy generation all the way to end-of-life battery disposal or recycling. In addition, the transition from domestic energy to sources or technologies that rely on the importation of certain rare materials to build batteries should be considered.
- Of greatest significance to the fuels marketplace and American consumers, policymakers must consider the skewed incentives (e.g., tax and regulatory policy) for electric vehicles that may lead to an anti-competitive refueling marketplace. In particular, public utility companies should not be able to invest in electric or alternative fuel recharging infrastructure by using ratepayer funds. It is difficult for the private sector to compete with that investment structure. Certainly, we question the appropriateness of public utilities using electricity payments made by the majority of the population (many of whom do not drive electric vehicles) to fund both the recharging stations and the actual refueling of electric vehicles. If states permit them to do so, this will likely result in a monopoly on the provision of electric vehicle refueling that will negatively impact consumers in the long-term. In short, it would lead to a predominately government-run refueling program.
- Infrastructure concerns, including updating the power grid and the cost of maintaining the nation's roads and bridges must also be evaluated. In light of the retail fuel industry's experience providing price competitive services to consumers, we encourage Congress and the states to work with industry and other stakeholders to find ways to deploy electric charging infrastructure via the existing privately developed motor fuels infrastructure.

II. INTRODUCTION

Chairman Shimkus, Ranking Member Tonko, and Members of the Subcommittee, thank you for the opportunity to testify on the future policy implications of electric and conventional vehicles, including the relationship between electric vehicle (“EV”) deployment and the liquid fuels marketplace. My name is Dylan Remley and I am Senior Vice President of Terminal Operations for Global Partners LP (“Global”). In addition to overseeing all operational aspects of Global's wholesale bulk storage

terminals, I also oversee our alternative energy efforts, which include a variety of potential initiatives such as EVs, battery backup, photovoltaic energy (solar), and alternative fuels.¹

I am testifying today on behalf of the National Association of Convenience Stores (“NACS”)² and the Society of Independent Gasoline Marketers of America (“SIGMA”).³ Members of NACS and SIGMA (hereinafter the “Associations”), including Global, account for approximately 80 percent of retail motor fuels sales in the United States.

The Associations’ members are consumer-facing entities that constantly adapt to changing consumer demands, and are thus effective surrogates for consumers. It is important to remember that offering a product for sale does not guarantee that consumers will purchase it. Motorists do not purchase retailers’ products because they are available for sale; retailers sell products because customers purchase them. Thus, fuel retailers will continue to invest in equipment to support liquid, renewable and alternative refueling if customers demand it and presuming a return on investment is possible.

With regard to liquid fuels, in the U.S., gasoline purchases account for about five percent of all consumer spending in a year. Retailers’ competition for market share, along with certain market pricing realities, have made the U.S. fuels market one of the most competitive and transparent markets in the country. Consumers will often change where they buy gas to save just a few cents per gallon.⁴

As Congress, the Administration, and relevant industry stakeholders consider the future of the nation’s transportation fleet and the fueling marketplace that supports American motorists, I am pleased to provide the Associations’ perspective.

A. Background on the Fuel Retailing and Convenience Industry

In 2016, the fuel wholesaling and convenience industry employed more than 2.7 million workers and generated \$549.9 billion in total sales, representing approximately 3 percent of U.S. Gross Domestic Product.⁵ Of those sales, approximately \$317 billion came from fuel sales alone. Because of the number of fuel and other transactions in which the industry engages, fuel retailers and marketers handle approximately one of every 30 dollars spent in the United States. Convenience stores serve about 160 million people per day—around half of the U.S. population—and the industry processes over 73 billion payment transactions per year. Nevertheless, the convenience store and fuel retail industry is truly an

¹ As Senior Vice President, I also develop and oversee Global’s strategy and government relations. Prior to joining the wholesale side of Global’s business, I served as Deputy General Counsel for Global’s gasoline distribution and station operations group.

² NACS is an international trade association representing the convenience store industry with more than 2,100 retailer and 1,750 supplier members, the majority of whom are based in the United States.

³ SIGMA represents a diverse membership of approximately 260 independent chain retailers and marketers of motor fuel.

⁴ According to a 2017 NACS survey, 67% of consumers say they would drive five minutes out of their way to save 5 cents per gallon and 61% say that price is the most important factor in determining where they buy gas. See *How Consumers Behave at the Pump*, NACS, <http://www.convenience.org/YourBusiness/FuelsCenter/Pages/How-Consumers-Behave-at-the-Pump.aspx#.Ws4QQS7wbb0>.

⁵ All data in section II.A comes from the NACS, State of the Industry Report (2016).

industry of small businesses. Approximately 63 percent of convenience store owners operate a single store.

The fuel wholesaling and convenience store market is one of the most competitive in the United States. Today, there are approximately 150,000 retail fueling facilities throughout the nation. The majority are owned by independent companies, whether single-store operators or regional chains, and each of these businesses have different approaches to how they buy and sell fuel. Less than 5 percent are owned and operated by the integrated oil companies.

B. About Global Partners LP

i. Overview

Founded in the 1930s as a small retail heating oil distributor, today Global is a midstream logistics and marketing master limited partnership engaged in the purchasing, selling, storing and logistics of transporting petroleum and related products, including gasoline and gasoline blendstocks (such as ethanol), distillates (such as home heating oil, diesel and kerosene), residual oil, renewable fuels, crude oil and propane.⁶ We own, control or have access to one of the largest terminal networks of refined petroleum products and renewable fuels in Massachusetts, Maine, Connecticut, Vermont, New Hampshire, Rhode Island, New York, New Jersey and Pennsylvania (collectively, the “Northeast”) with additional terminals in North Dakota and Oregon. Global is also one of the largest distributors of gasoline, distillates, residual oil and renewable fuels to wholesalers, retailers and commercial customers in the New England states and New York. In addition, Global is one of the largest independent owners, suppliers and operators of gasoline stations and convenience stores in these areas, with a portfolio of approximately 1,450 owned, leased and/or supplied locations in the Northeast, Maryland and Virginia. Of those 1,450 locations, we directly operate approximately 260 sites.

ii. Global & EVs

At Global, we believe that we have some of the best locations for the driving and motoring public to refuel vehicles. We have chosen our retail locations with care and we constantly strive to provide the best refueling services to consumers. If consumers want to refuel with electricity, as opposed to gasoline and diesel fuel, this means that we will strive to provide that service to our customers in the most efficient and convenient way possible. As with traditional liquid refueling, we want consumers to stop at our stores not only to refuel, but to generate foot traffic in the stores. We want our sites to be convenient for the public to access and to provide them with the services they want and need.

With that in mind, Global is actively analyzing and considering investments in alternative energy efforts, including EV recharging. Most recently, we partnered with Electrify America to install EV charging stations in one of our stores.⁷ While this will be Global’s first foray into EV recharging at

⁶ Global Partners LP is a publicly traded master limited partnership.

⁷ Samantha Oller, *Casey’s, Sheetz and Alltown Charge Up with Electrify America*, CSP News (Apr. 24, 2018), http://www.cspdailynews.com/fuels-news-prices-analysis/fuels-news/articles/casey-s-sheetz-and-alltown-charge-electrify-america?utm_source=Marketing%20Cloud&utm_medium=email&utm_campaign=CSP_Fuels_05-01-2018&sfmc_s=1601627.

retail, we continue to explore options with other EV providers. The reason Global is looking into EV recharging is simple: we are striving to meet the ever-changing needs of our customer base.

That being said, we do have concerns with the way some states are trying to expand the EV market by having public utility companies sell electric refueling in an anti-competitive and anti-consumer manner.

The Associations' concerns are expressed in further detail below.

III. ELECTRIC & CONVENTIONAL VEHICLES – POLICY CONSIDERATIONS

A. The Environment and National Security

Many studies have been conducted on the impact of conventional internal combustion engine vehicles on the environment, which have resulted in the passage of laws and the enactment of regulations to promote air quality controls and renewable fuels. Now, many are pushing for the widespread adoption of the so-called “zero emission vehicle,” the plug-in or battery EV. The concept of a “zero emissions vehicle,” however, is a misnomer.

EVs are powered by electricity generated at power plants across the country; approximately 63 percent of which is generated from three different fossil fuels: coal, natural gas, and petroleum.⁸ This generation results in emissions. Further, the lack of a true well-to-wheels EV analysis is a cause for concern given the general desire of many policymakers to push EVs as the vehicle of the future. This is because available evidence shows that many factors impact the overall efficiency of EVs. For example, EV efficiency is affected by the geographic region where an EV is being used, which impacts the grid emissions profile of these vehicles among other factors. For instance, in many parts of the country, the electricity powering EVs is generated from coal, which has a vastly different emissions profile than hydropower. Other factors also impact the EV emissions profile including, but not limited to, driving patterns (e.g., highway vs. city driving) and climate (e.g., ambient temperature).⁹ In short, the environmental benefits of EVs can vary significantly—and a hybrid or high efficiency internal combustion engine may be the more environmentally friendly option depending on the vehicle type and the place where it is being driven.¹⁰

Furthermore, while there has been some discussion of the environmental impact of batteries,¹¹ not enough attention has been paid to what happens to the batteries after an automobile reaches the end

⁸ See U.S. Energy Information Administration (EIA), *Electricity in the United State is produced with diverse energy sources and technologies*, https://www.eia.gov/energyexplained/index.php?page=electricity_in_the_united_states; see also EIA, *FAQs: What is U.S. electricity generation by energy source?* (2017), <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3>.

⁹ “Temperature has an important effect on vehicle efficiency due to heating, ventilation, and air conditioning use and temperature-related battery efficiency effects.” See Tugce Yuksel *et al*, *Environ. Res. Lett.* 2016, 11-044007, at 4.

¹⁰ *Id.*; see also Mili-Ann M. Tamayao *et al*, *Environ. Sci. Technol.* 2015, 49, 8844–8855.

¹¹ This includes the environmental impact of mining for the rare earth minerals used to construct the batteries.

of its life. How will batteries be recycled? Where will they be disposed if they cannot be recycled or after their recycled life comes to a close? Moving forward now and figuring out the battery conundrum later will not work or benefit the public. Similarly, it is not clear that we understand the potential health impacts related to battery disposal. These are important policy considerations that must be thoughtfully examined, analyzed, and concluded before moving forward with a massive investment in and shift of fueling infrastructure in the U.S.

It is also important for lawmakers to consider the energy security and independence questions surrounding EVs just as they considered those policy implications when enacting the Renewable Fuel Standard (“RFS”).¹² Over the past decade, the U.S. has made significant strides to achieve energy independence and energy security. Not only is the nation expected to become the top producer of oil by 2020,¹³ the U.S. has also severely limited its imports of crude oil and finished products from politically unstable nations, while simultaneously making strides to enhance overall vehicle efficiency and thus reduce domestic consumption of motor fuels. It seems counterproductive, therefore, for policymakers to immediately push to transition to electricity powered vehicles that will not only come at a significant cost in the form of energy distribution (i.e., infrastructure) but will rely on the importation of certain raw materials (i.e., heavy metals for batteries) from countries that may not be considered politically or economically stable. For instance, the batteries in EVs come from many materials, including lithium, manganese, nickel, cobalt, and graphite, among others, which are mined in many different countries across North America, South America, Africa, Asia, and Southeast Asia.¹⁴

B. The Importance of the Private Marketplace for Vehicle Refueling

The Associations’ members are consumer-facing businesses and are constantly adapting to changing consumer demands. Fuel retailers will continue to invest in equipment to support renewable and alternative fuels, whether it is biofuels, compressed natural gas, or electricity, if our customers demand it—and presuming a return on investment is possible.

The single greatest concern that many of the Associations’ members have with the push to transition to EVs arises from efforts by state public utility companies to enter the alternative fuel

¹² Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (2005); Energy Independence and Security Act, Pub. L. No. 110-140, 121 Stat. 1492 (2007). The RFS was designed to: (1) enhance the energy security and independence of the United States by displacing petroleum products from unstable sources with renewable fuels, and (2) increase the use of renewable fuels that have more favorable emissions characteristics than traditional petroleum-based products.

¹³ Osamu Tsukimori, *U.S. to overtake Russia as top oil producer by 2019 at latest*: IEA, Reuters (Feb. 26, 2018), <https://www.reuters.com/article/us-energy-iea/u-s-to-overtake-russia-as-top-oil-producer-by-2019-at-latest-iea-idUSKCN1GB0C6>.

¹⁴ Henry Sanderson, *Electric vehicle ambitions spark race for raw materials*, Financial Times (Oct. 23, 2017), <https://www.ft.com/content/44af43da-a1d6-11e7-8d56-98a09be71849>; See also, Jeff Desjardins, *Here are the raw materials we need to fuel the electric car boom*, Business Insider (Oct. 27, 2016), <http://www.businessinsider.com/materials-needed-to-fuel-electric-car-boom-2016-10> (noting that many of these minerals come from South America, Asia, Southeast Asia, and Africa. In fact, 65% of all cobalt production comes from the politically unstable Democratic Republic of Congo); see also James Stafford, *A New Lithium War Is About To Begin*, Oilprice.com (Apr. 24, 2018), <https://oilprice.com/Energy-General/A-New-Lithium-War-Is-About-To-Begin.html>; see also Chris Reiter and Christoph Rauwald, *VW Just Gave Tesla a \$25 Billion Battery Shock*, Bloomberg News (Mar. 13, 2018), <https://www.bloomberg.com/news/articles/2018-03-13/vw-secures-25-billion-battery-supplies-in-electric-car-surge>.

recharging space with an unfair market advantage. To be clear, we have no problems with a public utility company entering the electric fuel recharging business *provided* it is competing for that business on equal footing with the private sector. As previously mentioned, Global has partnered with and is actively seeking additional partners in the EV refueling space.

Today, many states effectively grant utility companies a monopoly over the provision of electricity in a particular marketplace. In exchange for the loss of market freedom, utility companies are guaranteed a rate of return from ratepayers. Moreover, in many instances, utility companies can even recover their investment costs if those costs are included in the rate base. This model stands in stark contrast to most industries in the U.S., including the retail fuels industry, where robust competition propels the industry towards greater efficiency, diversified options, and greater price competition for consumers.

Recently, utility companies have sought approval to enter the EV recharging business *and* treat their capital investments in that business as part of the utility rate base that all of their customers must pay. This is very troubling. The private sector cannot compete with zero market entry costs. Thus, when states and their public utility commissions (“PUCs”) permit these investment plans to go forward, they are essentially surrendering to those utilities a monopoly on the service of EV refueling. Such monopolies undercut the competitive nature of the refueling marketplace, ultimately harming consumers by disincentivizing efficiency (a natural byproduct of competition) and leading to increased costs to refuel.

Over the past few years, utility companies have filed large complex rate cases with PUCs seeking approval to spread in some individual instances upwards of \$75 million dollars across the rate base. Moreover, since January 2018, “utilities in over 30 states, recognizing an opportunity to improve their returns with minimal risk to their shareholders, have received approval for or proposed programs to increase EV adoption within their service territories.”¹⁵

If states want to encourage the development of EV infrastructure, they should do so. In fact, the Associations’ members look forward to participating in the development of future EV refueling. However, this should *not* be undertaken at the price of granting a monopoly to public utilities. Any special incentives a state provides to a public utility should be provided to all market participants on an equal footing. Otherwise, the private market will not be able to compete with a quasi-government entity that is entering the marketplace with a significant economic advantage. If the private sector cannot compete, the private sector’s ability and desire to invest in the alternative fuel marketplace will be limited. This, in turn, will result in fewer refueling options and less marketplace competition, which is generally bad for consumers as less market competition tends to lead to higher prices.¹⁶

¹⁵ Kevin C. Conroy and Kelly Caiazzo, *Utility Use of Ratepayer Funds to Promote Electric Vehicles* (Jan. 2018), prepared for the Society of Independent Gasoline Marketers of America (SIGMA). See also Colin Campbell, *Maryland’s utilities propose spending \$104 million on statewide electric-vehicle charging network*, The Baltimore Sun (Mar. 26, 2018), <http://www.baltimoresun.com/business/bs-md-electric-vehicles-20180322-story.html>; Mark Williams, *Ohio Regulators Green-Light Utility’s \$10M Plan to Install More EV Charging Stations*, The Columbus Dispatch (Apr. 26, 2018), <http://www.govtech.com/fs/transportation/Ohio-Regulators-Green-Light-Utilities-10M-Plan-to-Install-More-EV-Charging-Stations.html>.

¹⁶ From a policy perspective, it is also important to consider whether investment incentives for government-run enterprises are appropriately aligned as they are in the private sector. For instance, government-run enterprises may under-invest in some

Utility companies have both regulated and unregulated parts of their business. If those companies would like to invest in electric charging infrastructure via their unregulated subsidiaries that must compete with the private sector on a level playing field, that would be perfectly fine. Those companies should not, however, be able to fund investment in alternative refueling and the cost of the product itself on the backs of ratepayers. Not only are retailers unable to compete against ratepayer backed investment, it is also inappropriate for utility companies and states to be regressively funding electric recharging infrastructure on the backs of ratepayers – the vast majority of whom do not drive EVs. Under the typical utility structure, people, who pay for electricity to heat and light their homes, are subsidizing refueling for individuals who are able to pay at least \$50,000 per EV after taking into account the federal EV tax credit.¹⁷ Further, fuel retailers are significant ratepayers – *utilities are retailers' third largest operating expense*¹⁸ – so in paying for their own utility bill, retailers are funding their competitors and paying for their former customers to refuel their vehicles with “free” electricity.¹⁹ The unequal playing field that is quietly being established in the EV space raises serious concerns for lawmakers and a troubling competitive imbalance for fuel retailers and American consumers.²⁰

C. Infrastructure

The concerns enumerated above relating to marketplace investment in EV refueling bring us to the last major policy area: infrastructure.²¹ Considerable energy is necessary to power EVs,²² and this

areas and over-invest in others—they are unlikely to have the most convenient locations and the most consumer-friendly operations (e.g., hours of operations, customer culture, etc.)—all of the things that private businesses must invest in and constantly improve in order to survive.

¹⁷ There are currently 23 EV models available for sale in the U.S. with a weighted average retail price of \$51,500 after the federal tax credit of \$7,500. “Electric Vehicle Outlook 2017,” Bloomberg New Energy Finance (July 6, 2017) at 11. This average price for an EV is significantly below the cost of some of the available models (e.g., 2019 BMW i8 Roadstar MSRP \$163,300; 2019 Jaguar I-PACE S – MSRP \$69,500).

In addition, a study by Pacific Research Institute found that 79 percent of the EV tax credits were taken by consumers with annual household incomes greater than \$100,000 per year, and households with \$50,000 per year or more made up 99 percent of EV tax credits. See Jon LeSage, *The Biggest Challenge in Electric Car Markets* (Apr. 29, 2018), Oilprice.com, <https://oilprice.com/Alternative-Energy/Renewable-Energy/The-Biggest-Challenge-In-Electric-Car-Markets.html>.

¹⁸ Utility expenses, which include electricity, are retailers’ third largest operating expense. NACS, State of the Industry Survey Data from 2017.

¹⁹ Today, it appears that the predominant model used with regards to EV refueling is to give electricity away at the meter. Nevertheless, there are different pricing schemes being implemented on the ground, including parking rental, dwell time charging, etc.

²⁰ And of course, costs (such as the cost of the electricity for vehicle refueling) will evolve and change over time. Retailers obtain electricity from public utilities. Thus, if at some point in the future, retailers are competing with public utilities for consumer electric refueling business, they must be protected from a public utility charging them (as their competitor in the refueling space) a higher price for the refueling commodity (i.e., electricity). There may come a time when public utilities must be required to charge their competitors (i.e., retailers with EV refueling locations) a price for electricity which is no higher than the price at which they transfer power to their own refueling locations.

²¹ It is also important to consider how a transition to EV powered vehicles would impact citizens during natural disasters when the electric grid is shutdown.

will place a strain on the existing power grid, particularly during peak hours.²³ For example, research conducted at the National Renewable Energy Laboratory in Colorado found that “a high concentration of adoption [of EVs] in specific neighborhoods” can “significantly increase the peak demand seen by distribution transformers” and can “require upgrades to the electricity distribution infrastructure.”²⁴ Grid strain and grid support are complex questions that will need to be addressed at the state level—and upgrades to the electric power grid will take money.

In addition to the necessary upgrades to the nation’s power grid, lawmakers also must consider the impact of battery-heavy EVs on our roads. Unlike conventional vehicles, which support infrastructure investment because their owners pay the gas tax, EV owners use the country’s roads without paying the taxes that support its maintenance and development. This is particularly concerning at a time when the Highway Trust Fund is low on funds and our nation’s roads and bridges are falling apart. According to a Goldman Sachs analysis, EV adoption would drastically reduce that amount of government revenue that comes from the gas tax.²⁵ Thus, we encourage lawmakers to consider the impact of EVs on infrastructure revenue and investment because drivers of conventional vehicles should not be the only ones shouldering the infrastructure burden.

IV. CONCLUSION

To sum up, fuel retailers must constantly adapt to meet consumer demand—and today that means we must consider how to provide services to customers driving not only conventional vehicles, but also EVs. Given the prime location of retail fueling stores, the highly competitive nature of the industry, and the wealth of experience in refueling, we believe that the fuel retailing industry is well-positioned to meet consumer needs as EVs continue to enter the marketplace. However, we urge lawmakers to examine the many factors, which I have highlighted above, that accompany such a transition.

See *The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure Recovery Efforts*: Hearing before the Committee on Energy and Commerce, House, 115th Cong. (2017) (Testimony of Max E. McBrayer) <https://www.govinfo.gov/content/pkg/CHRG-115hhrg28115/pdf/CHRG-115hhrg28115.pdf>.

²² Bloomberg New Energy Finance, *Electric Vehicle Outlook 2017*, (July 6, 2017) at 3, available at https://data.bloomberglp.com/bnef/sites/14/2017/07/BNEF_EVO_2017_ExecutiveSummary.pdf (noting that “Electricity consumption from EVs will rise to 1,800TWh by 2040 from 6TWh in 2016. While this represents just 5% of our projected global power consumption in 2040, the ‘peakiness’ of fast-charging load profiles will need to be managed by utilities and regulators through the introduction of time-of-use rates to encourage off-peak charging, as well as storage solutions at the operator site which can mitigate high power demand from the grid.”).

²³ Nick Stockton, *Electric cars could destroy the electric grid – or fix it forever*, Wired.com (Feb. 03, 2018) <https://www.wired.com/story/electric-cars-impact-electric-grid/>.

²⁴ Megan Geuss, *How many electric cars can the grid take? Depends on your neighborhood*, Ars Technica (Jan. 23, 2018), <https://arstechnica.com/cars/2018/01/how-many-electric-cars-can-the-grid-take-depends-on-your-neighborhood/> (referring to the study by Matteo Muratory looking at uncoordinated EV adoption across neighborhoods).

²⁵ Tom Kloza, Oil Price Information Service (OPIS), *Goldman: EVs Represent Big Help for Big Oil* (Mar. 27, 2018). Presentation. NACS State of the Industry Summit.

In particular, the Associations exhort lawmakers to ensure that EV recharging and infrastructure investment is done through the private sector and on a level playing field so that tax and other incentives are not provided to certain stakeholders and not others. To do otherwise risks granting a de facto monopoly on the provision of refueling services and making them quasi-government entities, which will likely lead to inefficiencies and an increase in costs for consumers in the long-term. In contrast, the current private retail fuels marketplace, which developed over decades, developed by responding to consumer demand.

Congress and states should work with the convenience store industry and other potentially affected parties to find ways to deploy an electric charging infrastructure using the existing privately developed motor fuels infrastructure in order to ensure local businesses that have made investments in their properties are not negatively impacted by federal or state plans to support alternative fueling locations.

Thank you for the opportunity to testify before you today, I am happy to answer any questions you may have.

Mr. SHIMKUS. Thank you very much. What a great panel. I appreciate all your time. It shows you the challenges that we have in front of us.

So with that I will recognize myself 5 minutes to start the round of questioning. And this is really for anyone. You all have been following what we have been doing. Our last hearing on April 13th talked about the opportunity of high octane fuels and vehicles optimized to use them. Do you see that as a benefit to meeting CAFE and environmental emission issues if we moved to a high octane standard? And this is open to any of the panelists who may want to answer that question.

Bob, first?

Mr. DINNEEN. Sure. Absolutely, Congressman, as I mentioned in my testimony, we believe that high octane fuels with optimized engines represent a tremendous opportunity to generate efficiency gains and carbon reductions. It is the way of the future and can be one of those future technologies that is providing consumer choice and savings at the pump.

Mr. SHIMKUS. Mitch?

Mr. BAINWOL. We would agree that octane offers an opportunity for fuel efficiency gains and we are agnostic about the source of the octane, but ethanol is a low-cost option.

Mr. SHIMKUS. Well, Mr. Bainwol, so in our debate we have talked to, in essence, our big three, but obviously you represent a broader spectrum of manufacturers who haven't been in discussions with us yet. Do you think they would eventually see this as an opportunity for meeting the CAFE and some of the environmental issues?

Mr. BAINWOL. So I think most folks agree that there is a value to octane and its conversation, I think, is taking place and will accelerate. Just last week a number of our members met with Bob and others from the ethanol community, so I think it is timely, ripe, and we are happy to engage.

Mr. SHIMKUS. Great.

Mr. Macchiarola?

Mr. MACCHIAROLA. Sure. Mr. Chairman, we believe the idea of a 95 RON technology-neutral national performance standard is an intriguing one. Certainly it would have to be coupled in a conversation about broader RFS reform that we believe must include a sunset of the program, but again we also think on the question of 95 RON there are outstanding questions, questions about timing, the phase-in period of which it would be phased in, questions about potential costs at retail, potential mislabeling issues, are all questions that need to be analyzed and assessed. But again we appreciate your efforts on comprehensive RFS reform.

Mr. SHIMKUS. Let me go to Mr. Remley.

Mr. REMLEY. Chairman, if I can just comment briefly, I think we would agree with a lot of the comments that the rest of the witnesses had. It is a promising opportunity. I think the concern just raised by Mr. Macchiarola would also be echoed at the retail level which is labeling. There are still questions from OEMs with regards to higher ethanol blends, but the concept of the 95 RON and higher octane is certainly a promising development.

Mr. SHIMKUS. Great, thanks.

I want to move to my next question so I want to go to AAA, Ms. McKernan. The price of EVs are still high and the long charging stations makes it difficult to take long trips. I am from rural Illinois and I represent 33 counties. Over the last week I spent almost 6 hours on the road every day I was home. So can EVs ever work for lower income households especially ones that can only afford a single car?

Ms. MCKERNAN. Well, definitely range anxiety is beginning to ease and the number of charging stations has increased in the United States, reached a level of 16,000 in 2017. AAA's main concern is giving consumers a choice. And so we are not advocating one way or another that people should drive EVs or not, we want to provide the most information that we can for consumers so they have the choice.

Mr. SHIMKUS. So let me cut you off, I am getting short on time. But I wanted to ask because you mentioned roads and bridges, so how do we help—and this is not a Ways and Means Committee, in fact, my roommate Mr. Brady would be mad if I asked this question. But how do we then incorporate the electric vehicles into the funding of our roads and bridges systems? What is the secret sauce that allows us to help maintain those in a Highway Trust Fund?

Ms. MCKERNAN. I don't have that specific information. This particular study didn't cover anything like that. But I would be happy to have AAA's staff follow up with a response.

Mr. SHIMKUS. Well, I think that is going to be, it is an important debate if you talk to folks in the Transportation Committee and also the Ways and Means, is why haven't we done anything on roads and bridges is this Highway Trust Fund fight. So this is going to be, whether it is now or the future it is going to be part of the debate.

Let me go back to Bob for my final question. In your testimony you suggest that environmental benefits of EVs are overstated while the environmental benefits of biofuels are not fully accounted for. How would you suggest fixing that?

Mr. DINNEEN. Well, I think they need to look at a full lifecycle analysis for all fuels and technologies. For ethanol, Congressman, they count the angels on the head of a pin. They look at the energy it takes to produce the fuel. They take the energy that is used in the production of the fertilizer on the farm and the energy it takes to produce the John Deere hat the farmer wears. Heck, they even count emissions from overseas from indirect land use. And for electricity they only are looking at the carbon not the tailpipe and the source of the electricity is not considered and that just gives a disparate view.

Mr. SHIMKUS. Thank you. My time has expired. I am going to move to the ranking member of the subcommittee, Mr. Tonko, for 5 minutes.

Mr. TONKO. Thank you, Mr. Chair.

Ms. McKernan, earlier I mentioned some of the trends that AAA has identified on potentially changing consumer attitudes on EVs. Do you have any thoughts on whether there might be a growing consumer acceptance of EVs?

Ms. MCKERNAN. Yes, there definitely is a growing consumer acceptance. The more consumers can learn about the technology,

what the capabilities are, and seeing whether or not it can fit into their lifestyle, I think, is what is helping to change their attitudes.

Mr. TONKO. Thank you.

And Dr. Reichmuth and Ms. Cullen, some have suggested that low penetration of EVs is because consumers do not want them. Is that a fair assessment?

Mr. REICHMUTH. If I may, that is not a fair assessment because the consumers in the marketplace for a new car are not seeing the same variety of models that they are seeing in gasoline vehicles. So there are cars that are not available in every state, the Fiat 500E is only available in two states, for example. There is no plug-in pickup truck yet so if you are in the market for a pickup. There are also brands that don't offer an EV, so you can't get a Jeep or a Lexus plug-in yet. So, when you just look at the penetration rate, the number, the amount of sales, it doesn't reflect necessarily the consumer desire to buy an EV if they can't get that EV on their dealers' lots.

Ms. CULLEN. I would also point out that you are talking about penetration in an extremely large market so while the percentage might be small in penetration the growth of the market has been substantial. As I noted, we went from two vehicles on the market in late 2010 to almost 50 varieties at different price points today and those offerings are only increasing. Every major auto manufacturer has announced plans to diversify their fleets, their price points, the sizes, to offer the additional segments and performance profiles that consumers are looking for.

So I think it is also important to note again the market has grown every year since introduction and that 2017 represents a 71 percent increase in sales over 2015. So this market is growing, but we are pretty new and we are a small part of the enormous car park.

Mr. TONKO. And again, Ms. Cullen, one of the biggest barriers to greater EV adoption has been a lack of charging infrastructure. You cite a Navigant study that estimates sales of fast chargers are expected to increase from 20,000 to over 70,000 annually within a decade. What role will this deployment of fast charging infrastructure have in further EV adoption?

Ms. CULLEN. The expansion of DC fast charging will absolutely facilitate expanded use of electric transportation and it might be worth just taking a second for those people that don't live and breathe this that so there are levels of charging. Level 1 is the outlet in your home. Level 2 at 240 volts is what your dryer or your refrigerator would run after and that reduces the charging time of an EV by half. A DC fast charger reduces that charging time again to a point that enables essentially long distance traveling in a pure battery electric vehicle.

I would also add that the question—you can also build range confidence by building in extra battery capacity in the vehicle. And that is what is happening. We are seeing longer ranges in battery vehicles and the fact that there are plug-in hybrids where you have the addition of an internal combustion engine that can service all your longer distance needs and perhaps do all of your daily commuting on electricity.

Mr. TONKO. Thank you.

And Dr. Reichmuth, a majority of EV charging occurs at home. Unfortunately, this is not an option for everyone especially in cities which may have high potential for EV adoption due to shorter commuting but also have many people living in apartment buildings, multifamily houses, or in neighborhoods without dedicated parking spots. So do you have any suggestions of how to enable this population to access EV charging infrastructure?

Mr. REICHMUTH. Yes. That is an important consideration. So there is a number of things that are going on. One is the increase in putting charging into multifamily dwellings, so apartment buildings, condominiums, and a number of the utilities are working hard at that right now. We can also take a look at building codes. Putting at least conduit and the space for EV charging in parking garages and new facilities, you don't have to put the wiring, you don't have to put in the charging equipment itself. You can just put the conduit so you don't have to rip up concrete or rip up a parking lot to put in charging later.

And then the last thing is DC fast charging in urban environments not just for people that don't have a place to park at home and to charge at home, but also to enable taxi, ride sharing, and other uses of electric vehicles in the urban environment, so having that fast charging within the urban environment.

Mr. TONKO. Thank you very much. I yield back.

Mr. SHIMKUS. The gentleman yields back his time. The chair now recognizes the gentleman from Ohio, Mr. Johnson, for 5 minutes.

Mr. JOHNSON. Thank you, Mr. Chairman, and thanks to all of our panel members for being here this morning. I appreciate this discussion.

Ms. Williams, the electricity grid is becoming increasingly complex with electric vehicles being just a part of that increasing complexity. This presents us both with opportunities and challenges for the grid. Along those lines, can you identify any potential cyber threats associated with increased usage of EVs and what is the industry doing to tackle these challenges?

Ms. WILLIAMS. Thank you very much for that question. So as you know, the electric utility industry, the energy companies of America, we take cyber threats extremely seriously. We work very closely with the government looking at standards, looking at our controls, looking at specific things we need to do to make our grid the safest and the most cyber secure that it can be. Of course when you look at electrification overall, more points, electrification whether they be electric vehicles or other things do in fact present additional opportunities for a hacker to get in and that is why we have got to be so vigilant, again working closely with government to make sure that our system is up to code, that we have good monitoring in place, early detection, and fast response.

We view charging networks or chargers very much like an appliance and as our homes become smarter, as really the grid becomes smarter we have to increase the level of vigilance and make sure that it is up to code in everything that we have in place. There are NERC standards, there are any number of standards that we comply with to make sure that they are cyber secure.

Mr. JOHNSON. Sure. Well, my background is information technology and I have said it many, many times, cybersecurity is not

a goal that has a finish line because as soon as you solve one problem there is a dozen more right on the backside of it. It is just something we are going to have to remain vigilant on and I appreciate that.

Mr. Macchiarola, the oil and gas industry has undergone significant changes due to breakthroughs and technological advancements. Eastern and Southeastern Ohio, for example, has benefited greatly from the Utica and Marcellus shale gas plays and I think the ability to access this cheap oil and gas took many people by surprise. And I think this example plainly shows we can't always predict future technological breakthroughs nor the impact that these breakthroughs will have on the different sectors of our economy such as the automobile industry.

So as Congress looks at current and future transportation policies, how can we ensure that we are not jeopardizing the private sector's ability to innovate and bring about new technological advancements?

Mr. MACCHIAROLA. That is a great question, Congressman, and you know firsthand the experience of the shale gas revolution and in Ohio and your leadership on LNG exports helped bring that to markets around the world. From our perspective, I think the point you make is a strong one about the fact that tipping the scale, of keeping your finger on the scale for government through mandates or through incentives can have a real dampening effect on bringing affordable energy to the consumer, strengthening our energy security.

The example that I highlighted in my testimony, the Renewable Fuel Standard, is a perfect case of that. The estimates that we had both on the demand side and on the supply side totally missed the mark over the past decade and the result is we have a mandate that can't be met and needs to be reformed.

Mr. JOHNSON. OK, thank you.

Ms. Williams, back to you, I mentioned that I represent rural Appalachia. It is not uncommon for my constituents to have to travel 35, 40 miles up hills, down hills, around curves to go to work, to go check on Mom and Dad, to go to the grocery store or the hospital. The terrain is hilly and dependability is a must in automobiles, with light trucks and SUVs and pickups largely making up the vehicles of choice. While I see EVs making inroads in the cities, they face a different set of challenges in my neck of the woods. Do you believe that EVs will become viable in rural parts of the country that have weather and terrain and distance challenges like that?

Ms. WILLIAMS. I do believe they will become viable in all parts of our society. Within our own service area we have hills and lots of varied terrain. We have a lot of agricultural parts of our service area in our Central Valley and our North Valley. Some of these areas also end up being some of our most disadvantaged.

So one of the things that we are doing as we are doing these pilots to put in more charging networks is going to learn a great deal about as you put these charging stations in different parts of our service area, some of which are disadvantaged communities, some of which are rural, how does it impact the adoption of electric vehicles, does it make a difference? We think it will, but it is going to

be an interesting pilot for us to learn from so that we can take those learnings and then deploy them. As we have heard from some of the other folks this morning that are testifying, battery life is increasing and technology is really evolving and so what we have today may not be exactly what we have 10 or 20 years from now, so I do believe that it will be viable across the country.

Mr. JOHNSON. OK. Well, thank you, ma'am. And Mr. Chairman, I yield back.

Mr. SHIMKUS. The gentleman yields back his time. The chair now recognizes the gentleman—we have a lot of Californians on this subcommittee—so he recognizes the gentleman from California, Mr. McNerney, for 5 minutes.

Mr. MCNERNEY. I thank the chairman and I thank the panelists, a great set of viewpoints this morning.

Ms. WILLIAMS. I appreciate you giving us a shout-out to Stockton and the work with the RTD out there to electric our bus systems. What sort of integration challenges do the electric utilities face and are there grid related benefits to EV penetration?

Ms. WILLIAMS. I do believe there are grid-related benefits. One of the things that we find in California as we know, Congressman, is we have plentiful solar renewable resource available to us, often more than we need in the middle of the day. And I believe that electric vehicles provide us an opportunity through smart charging, through incentives to really, our customers to charge at the right time to take advantage of that plentiful resource that is there to really better utilize this incredible energy grid that we have. At the same time we are seeing second use batteries being grouped and deployed to become almost like a battery to grid resource. So in the middle of the night when we don't have the sunshine, the battery, the second life batteries provide us needed resources to really smooth out the resource requirements for our system.

Mr. MCNERNEY. So when you refer to wireless smart charging you are referring to the communication being wireless not the charging?

Ms. WILLIAMS. Correct, the communication, the telematics.

Mr. MCNERNEY. Right. Do you have any rebuttal to Mr. Remley's comments that the utilities are being guaranteed a rate of return and building EV infrastructure on the backs of ratepayers?

Ms. WILLIAMS. I do. Energy companies like PG&E Corporation or PG&E are not guaranteed a rate of return. That is a rate of return that is set and if you operate your system efficiently and effectively and deploy your capital and run your business efficiently you could achieve that but you don't often achieve that necessarily. As far as the whole approach of the utilities somehow expanding their monopoly, we believe in competition and EEI nor PG&E believes that there is one point of view in terms of what that business model looks like. We look forward to partnering with third parties in terms of the actual ownership of the charging network. We view ourselves as an enabler. We view ourselves as, because of our scale, because of our capital as spurring this important resource into happening, but we certainly don't believe that we are the only game in town. We want to help electric vehicles actually become more of a reality. Again we see ourselves as an enabler, not as a monopolistic owner of those charging networks.

Mr. MCNERNEY. Thank you.

Mr. Reichmuth, how do EVs lifecycle global warming emissions compare to that of gasoline vehicles?

Mr. REICHMUTH. That is an important question. So with the research that we have done at UCS we found that, in general, driving on electricity is much cleaner than driving on gasoline from a global warming perspective. In our analysis we did an apples-to-apples comparison, looked at all the emissions from generating electricity and bringing it to the EV and compared that to getting crude oil out of the ground, refining it into gasoline, distributing it to service stations, and then of course burning it in the car. If you look at cars today on the road, the EVs on the road, they average emissions equal to an 80 mile per gallon gasoline car and that is higher in places with cleaner electricity, so over a hundred miles a gallon equivalent in California.

Mr. MCNERNEY. Thank you.

Mr. Bainwol, have the CAFÉ standards introduced an explosion of innovation in auto engineering? That is kind of a leading question, but go ahead and answer it.

Mr. BAINWOL. Yes, there has been massive investment in innovation both on a powertrain side and elsewhere, and certainly standards certainly bias some of those decisions.

Mr. MCNERNEY. Will the elimination as proposed by Mr. Pruitt impact that drive to innovation?

Mr. BAINWOL. There has not been a final NPRM so we don't know whether they are going to be eliminated or not. We are hopeful that this slope continues to rise. We are in favor of year over year fuel efficiency.

Mr. MCNERNEY. Thank you.

Ms. Cullen, do you know if the electric vehicle industry working to create appliances—let me read this as it is written. I am trying to innovate here. Do you know if the electric vehicle industry working to create small motors for industries such as agriculture is the industry working to create applications for agriculture?

Ms. CULLEN. It absolutely is. There is enormous growth in mobile equipment in the electric drive field. We are seeing them in tractors, in forklifts, and you are seeing applications at ports and other, and airports that the flexibility of electric drive is that it is very scalable and so that it can be used in small and light applications as well as larger and heavy duty ones because we are also seeing an enormous growth in the medium and heavy duty and the transit bus segment.

Mr. SHIMKUS. The gentleman's time is expiring.

Mr. MCNERNEY. Well, I will yield back then.

Mr. SHIMKUS. The gentleman yields back his time. The chair now recognizes the Chairman Emeritus of the Energy and Commerce Committee, Joe Barton, for 5 minutes.

Mr. BARTON. Thank you. I am happy to go, but Mr. Duncan was here before me if you—

Mr. SHIMKUS. I would like for you to allow Mr. Duncan to go first.

Mr. BARTON. I think Mr. Duncan is fully entitled. He showed up at his first baseball practice today and that gives him real priority.

Mr. SHIMKUS. The chair recognizes the gentleman from South Carolina, Mr. Duncan, for 5 minutes.

Mr. DUNCAN. Thank you.

And Mr. Bainwol, in your testimony you alluded to the obvious that when gas prices fall the desire to pay more for a vehicle with higher fuel economy diminishes. The statements reflect over the ebbs and flows of the demand in the market. Despite all the incentives to purchase EVs, they still only represent only 1 percent of all vehicles purchased last year. Despite the reality of the market, it is clear that government is trying to push consumers toward purchasing electric vehicles.

Now I believe that the market determines what people buy and people buy what suits their needs whether it is safety as a concern, whether it is size, horsepower, or whatever, and many people like to drive SUVs. For example, in my district light trucks, SUVs, pickups, and vans accounted for 63.92 percent of vehicle sales. Electric vehicles only accounted for 0.05 of the sales in 2016. Now my office did the math and that equates to literally 13 electric vehicles in my district, 13—770,000 people and 11 counties in South Carolina, in 2016 that equated to 13 vehicles.

It is clear my constituents don't really gravitate toward these vehicles. I am not going to say they don't like them. They don't gravitate toward them for a lot of reasons, probably price point being a big part of that, probably the need to carry things in a pickup or SUV. So the way I see it, when consumers are determining what vehicle to purchase they look to see if it fits their needs. I do recognize that the price of EVs are decreasing and I understand the Tesla Model 3 costs about \$35,000. Let me ask you this. If electric vehicles can be brought down to a price comparable to that of an average conventional new car, should the government be providing massive tax credit to purchase them?

Mr. Bainwol?

Mr. BAINWOL. So when we get to a point where the costs have equalized I think that is a good policy question. We face a reality today where globally and in this country we have requirements to meet both CAFE standards as well as the ZEV mandate in California and a bunch of other states that represent probably a third of the country. So we have a compliance reality where electrification really does help. And so the question here is when this inflection point occurs and that is a function of range and battery cost, and I think Bloomberg has estimated that by 2025 the price delta will equalize and at that point certainly with additional range then you can see the calculus for a consumer evolving.

Mr. DUNCAN. I agree. So let me ask you this. If we get rid of the tax credits and incentives do you truly believe consumer demand is there for electric vehicles?

Mr. BAINWOL. I think consumer demand is coming and we need for it to come. We do have a compliance reality that is just a matter of law and so we have got to comply and electrification is definitely a piece of that compliance. And as the battery costs come down and range improves then that becomes a viable compliance approach.

Mr. DUNCAN. I actually like electric vehicles. I like the thought process of it. I understand horsepower issues. An electric motor

pushes an aircraft carrier. So I also understand the simplicity. If you blow an electric motor you unplug it, put another one in, plug it back in, and the car goes. It is not like an internal combustion engine. I think the car manufacturers are recognizing the future as well. I think we are going to see that. The problem I have is when government picks winners and losers, when government is forcing consumers into a certain area like this because of some political beliefs and philosophical beliefs.

So, Mr. Chairman, I don't have any other questions, but thanks for holding the hearing. It has been informative. I yield back.

Mr. SHIMKUS. The gentleman yields back his time. The chair recognizes the gentlelady from Michigan, Mrs. Dingell, for 5 minutes.

Mrs. DINGELL. Thank you, Mr. Chairman. I thank you again to all of the witnesses for being here, a subject I deeply care about.

I am going to do my first questions to Mr. Bainwol and to Ms. Cullen. Can you elaborate on how the global shift to the electrification of mobility is affecting the U.S. manufacturing base and what kind of opportunity does this represent for the auto industry and its workers?

Mr. BAINWOL. I would just note that first slide I showed reflected a growth in unit sales from roughly 50 million units in 1996 to something approaching 100 million units. And as other countries right or wrongly determine that electrification is going to be a big piece of that for us to compete we have got to have an ability to innovate and to respond to that growing market.

Mrs. DINGELL. Ms. Cullen, any comment?

Ms. CULLEN. I agree completely with what Mitch just said there and I think as a matter of manufacturing and employment this global market is an enormous generational opportunity. The last time DOE looked at employment numbers they were looking at in 2015, just looking at the electric drive manufacturing segment they counted some 215,000 jobs. So that is fully 3 years ago. In that time that segment has grown as has the entire ecosystem associated with vehicles and infrastructure. So it is an enormous opportunity for our employment base and for our global competitiveness.

Mrs. DINGELL. As mentioned in your testimony, and to this committee and the House, the House unanimously passed legislation that we worked, I worked on, to facilitate the testing and deployment of autonomous vehicles. Can you both talk a bit more about the role EV technology plays in supporting AV's future?

Ms. CULLEN. First of all, thank you for your leadership on that issue. We are, I think everyone in the industry and everyone who actually uses roads is interested in the future of automation and how that changes transportation. I think what everyone who is looking at automation sees is that electrification is an optimal partner, because as a congressman pointed it is a simpler technology so there are fewer pieces to electrify. It is also more suited to the connectivity that is essential for automated transportation.

Again and finally, I think because of its drive cycles EVs are perfect partners for what is seen as the first market for automated vehicles which is urban shared mobility, sort of your Lyft vehicle, and that those short drive cycles are perfect for an urban EV.

Mrs. DINGELL. Thank you. I am going to be running out of time and I have a lot of questions. So let me ask you, switch to another

subject, I want to talk about the important role that Congress can play to incentivize EV adoption and deployment. The EV tax credit has played an important role in this, but should we be looking at tweaking it if necessary to make it even more effective? We know that today's electric vehicles cost more than the conventional gasoline powered cars. Do you believe that the EV tax incentive has helped consumers afford an EV that they otherwise would not?

Ms. CULLEN. Absolutely. The credit has been effective and it is working as designed by Congress. It is making a new technology, which has the standard price premiums associated with new technologies, more affordable to consumers which in turn is helping the industry build to scale and that is the global opportunity we are trying to capture.

Mrs. DINGELL. So I hear from manufacturers that the tax credit has been critical to EV sales. Do you think that when some manufacturers hit the cap and they may need to reduce the price and potentially lose even more money could this disincentivize EV production and could this cap potentially take us backwards? In your opinion, will auto companies reach production scale at 200,000 units or do we need a larger more robust EV market so that all manufacturers can take advantage of this scale?

Ms. CULLEN. I think it is important that Congress take a look and update that credit to reflect where the scale of the market is now. I think there is an important role for it to play going forward and having as many diverse entrants into the industry is critical.

Mrs. DINGELL. We know that about ten states currently offer EV incentives. Why isn't this doing enough? Why is it so important for the Federal Government to have a role here to the EV tax credit and can you even answer why when states who have these EV mandates said that they were going to put these vehicles into their fleets they haven't?

Ms. CULLEN. I cannot answer that question. I would leave that to the states. But the federal policy does speak to the importance of certainty and that is what consumers want, what manufacturers want, and what industry wants is they need some certainty to make their decisions and make their investments.

Mrs. DINGELL. I am out of time.

Mr. SHIMKUS. The gentlelady's time has expired. The chair now recognizes the gentleman from Texas, Mr. Barton, for 5 minutes.

Mr. BARTON. Well, thank you, Mr. Chairman. And since I allowed Mr. Duncan to go first since he showed up at baseball practice this morning, I should commend you, the audience that know this, but in addition to being such a great subcommittee chairman you are one of the all-time all-stars of the Republican baseball team and just announced your retirement. Your son is graduating, I think, the day of the game or the next day.

Mr. Shimkus is the only, I think this is true, the only current member of either team that has hit an over-the-fence home run, blue socks, he was my MVP pitcher a number of years, pitched the year after he had a heart attack. And you will be missed. In fact you were missed at the practice today, you not being there for the first time in 20 years. So in addition to being a great subcommittee chairman, you are just one of the best athletes to ever play in the baseball game and we will miss you.

Mr. SHIMKUS. How very kind of you. I was able to work on my nuclear waste bill though this morning so.

Mr. BARTON. I don't know if that is a good tradeoff, quite frankly. Anyway, we aren't here, we are basically here to talk about electric vehicles.

I have got, really, just two basic questions and I don't know who to ask them to, there are so many people at the witness table. My first question is what is the cost of a home electric vehicle charge station if there is such a thing in existence? Who can answer that?

Mr. Remley?

Mr. REMLEY. The costs vary widely. If you are talking about a Level 1 charger it can be a few hundred to a few thousand dollars and it ranges—

Mr. BARTON. I am talking about at somebody's house.

Mr. REMLEY. That is correct. It is going to be a few hundred to a few thousand dollars depending on the vehicle and a host of other factors. And a DCFC fast charger can be hundreds of thousands of dollars.

Mr. BARTON. Hundreds of thousands.

Ms. CULLEN. Congressman, may I?

Mr. BARTON. Sure.

Ms. CULLEN. Actually a Level 1 charger is the outlet in your house. You don't pay extra for that. You can just plug in your car. It will take longer to charge but you can do that for free. A Level 2 charger to install it with any sort of smart technology so that you could set a timer, you could spend a few hundred dollars to a couple thousand dollars depending on how smart you want it to be.

Mr. BARTON. But they are available?

Ms. CULLEN. They are.

Mr. BARTON. OK. Now what about a commercial charger at a, I call it a gasoline station. I guess you would call it an electric station. What would a commercial charger that you could just drive up and instead of fill up your tank charge your battery in some reasonable amount of time?

Ms. CULLEN. Right. So at the next level, in commercial facilities whether they are at coffee shops or at gas stations or anyplace where there is an electricity line you can install a commercial charging spot. And most people would use either a Level 2 if it is a place where people are going to be sitting for awhile like an airport where you are going to leave your car while you are on a trip. You could plug it in and charge it at a slower rate.

If you are, say, at Starbucks and you just have 10 minutes they would be interested in installing a DC fast charge, which is 480 volts, so that folks who went in to get a cup of coffee could get several or ten or twelve miles of charge in 10 minutes. And that costs, depending on how, the conduit and how complicated it is to lay down the line, \$50,000 would be—

Mr. BARTON. But those both in your home and commercially there is equipment available today?

Ms. CULLEN. Yes, in all price points and capacities.

Mr. BARTON. OK.

Mr. REMLEY. Congressman, if I may, just our personal experience we are installing them at our convenience stores. A brand new con-

venience store having separate chargers requires a separate, essentially, sub-mini station.

Mr. BARTON. It is a what?

Mr. REMLEY. It is a separate sub-mini station.

Mr. BARTON. Sub-mini station.

Mr. REMLEY. Yes. It requires 500 additional square feet and the total cost of bringing that in is several hundred thousand dollars.

Mr. BARTON. All right, but not going to be a lot of several hundred thousand dollar stations installed. This next question is much trickier. We fund a big chunk of new highway construction and maintenance through the Highway Trust Fund which is funded by a cents per gallon federal highway gasoline tax and in most states have the same thing, they tack on a state tax. Well, if your electric vehicle, you can't charge them per gallon so how do you, as we get more electric vehicles how do we set up a system where they pay into the Highway Trust Fund? Who wants to tackle that one?

Ms. CULLEN. I will have a go at it.

Mr. BARTON. OK. You are the lady with the answer today.

Ms. CULLEN. Well, first, pure battery electric vehicles don't use gasoline but plug-in highway vehicles do and they do pay a gas tax.

Mr. BARTON. Well, focus on all-electric.

Ms. CULLEN. So for that segment of the fleet we absolutely want to be part of a comprehensive solution that funds the infrastructure, the conventional and the infrastructure of the future that we need, and there are states looking at innovative ways to do that. And we certainly recognize that the gas tax system as it is not broken. We didn't break it, but—

Mr. BARTON. And nobody has claimed you broke it.

Ms. CULLEN [continuing]. The fact is it doesn't serve the current transportation sector. So I think we need to look at how everyone contributes and we want to be part of it.

Mr. BARTON. Oh, you don't have an answer. Does everybody who supports electric vehicles at the witness table agree that electric vehicles in some way should pay proportionately into the Highway Trust Fund? Is there anybody that disagrees with that? I think if—

Mr. BAINWOL. I would add just not a discordant note, but a point of complication and that is we have aggressive fuel standards in force that we have to comply with. I am not making a value judgment, I am describing what is. And in order to comply we need some level of electrification over the years to come as well as with the California ZEV program, and to the extent we put impediments in the way of adoption of electrification that makes that challenge a little bit deeper. So the point is that these policies can be contradictory and it is a tough thing to manage and our particular challenge is we need adoption of electrification in order to comply and that is just a fact of life and anything that makes that more challenging is a bit of a problem.

Mr. SHIMKUS. The gentleman's time, he was so nice to me so I gave him a little bit of extra time. So the gentleman's time has expired. The chair now recognizes the gentlelady from California, Ms. Matsui, for 5 minutes.

Ms. MATSUI. Thank you, Mr. Chairman. First of all, I would like to start by thanking Geisha Williams from PG&E. PG&E services

part of my district in California and it is always nice to have a fellow Californian here, although we do have plenty, I guess, here. We have seen the way that our changing climate has intensified natural disasters across the country and recent scientific studies have even been able to attribute the extent to which climate change has affected specific extreme events.

Ms. Williams, I know that your utility has felt the impacts of climate change on your operation. Those impacts include more intense wildfires and they are difficult for both rate payers and utilities and I appreciate that the State of California is taking a look at these issues. I am also pleased that you are taking tangible climate action that reduces emissions from the transportation sector to the benefit of both the utility and the environment. Tell me more about PG&E's work to facilitate EV deployment, because in our state it really is somewhat of a mandate.

Ms. WILLIAMS. Thank you for that question, Congresswoman. It is great to see you again. So we absolutely are facing climate change issues in the State of California and we certainly believe that the horrible, devastating wildfires that we had last year are very greatly attributable to the severe climate that we are seeing. So we have been on a journey in California for over a decade now in terms of really looking at emissions and reducing emissions. My own company has been very successful. Today, 80 percent of the power that we deliver to our customers is greenhouse gas-free and that is a great start. The next big area of focus for the State of California as we look at how do we continue to drive emissions down is absolutely the transportation sector.

Forty percent of the greenhouse gas emissions in the State of California come from transportation. I mentioned NO_x . I mentioned also particulate matter. There are such significant air quality issues in the State of California. Eight of the worst climate air quality, sort of, counties in the country are in California, so we are all in on dealing with the air quality issues, the greenhouse gas issues, and we truly believe that transportation provides us an opportunity to go through it.

Ms. MATSUI. Could I ask, Ms. Cullen, we talked about California and the Nation about the adoption of the EVs and I think somebody said one percent across the Nation. And you are saying, I think you said in California it is 3 to 4 percent; is that right? Are you the one who said that?

Ms. CULLEN. That was Mitch's number.

Ms. MATSUI. OK, good. I was wondering, what is a driver of the adoption in California? Is it policy, is it really a climate change, what is it? Would you like to comment on that?

Ms. CULLEN. It is a combination of factors. Certainly policy helps to drive adoption. Also, it is one of the largest car markets. There is a great deal of consumer education also in California and I think which is an important point that has been brought up by a lot of folks on this panel and a lot of the questioners that educated consumers are an important part of the deployment mix. And I think California has provided the important nonfinancial and financial incentives, the tax policy, as well as HOV lane access have also helped to speed adoption in the state.

Ms. MATSUI. OK. As you know I have been supportive of California's authority under the Clean Air Act to set its own light duty vehicle emission standards. And I am obviously concerned by the administration's effort to weaken the current national standards and the result will be more uncertainty, which is really bad for the consumers and the automakers and the environment, and last week the State of California and 17 other states sued the Trump EPA for its decision to revise the light duty vehicle standards.

I will go back to Ms. Williams. I understand that PG&E is supportive of the existing standards. Can you explain why you are supportive and how these standards affect your utility, broadly speaking?

Ms. WILLIAMS. Well, as I mentioned earlier, we truly believe that we have unique air quality issues in the State of California with eight of the ten worst air quality counties in the country, so we truly believe that it is a public health issue. We also believe that as we look at climate change, as we look at what we need to do to continue to reduce emissions, transportation is key to that. And we believe that electric transportation in particular is going to provide us a great means of reducing the GHG in the air and improve the air quality and that is why we are supportive of the California waiver.

Ms. MATSUI. OK, thank you.

And I don't want to leave you out, Mr. Bainwol. The automakers are really very important in this and we understand that. And I really believe that the EVs, I am looking at how we might do this. Listening to Mr. Duncan, we need to really expand, we need to have more research and development on how we expand types of vehicles that can be EVs. And I think we need to expand that aspect of it and if we give too much preference or to SUVs and light duty trucks with lower standards, I think we will have difficulty actually incentivizing people to buy the EVs. That is a comment on my part, if you want to respond.

Mr. BAINWOL. I just note that there is a challenge when the market and policy don't align and at some level the consumer is always right. So we need to, I think, to some extent when we have compliance issues we have got to educate the consumer and try to drive adoption, but at the end of the day we have got to satisfy the consumer.

Ms. MATSUI. But I think when you drive adoption, you really have to give more of a sense of the inventory has to be greater too, that is, we are not there yet.

Mr. BAINWOL. Well, the inventory one is coming, but this is the alignment. You can't produce if people don't want to buy it and we want them to buy it. We want to produce them and we want to sell them, but if you produce them and they sit in showrooms that does no one any good.

Ms. MATSUI. But if you make more of the other vehicles then there would be less incentive to get the EVs.

Mr. BAINWOL. Well, I think the big incentive challenges is that the success of the internal combustion engine has gotten stronger and stronger. It is up 30 percent in 12 years. So when you turn in your 12-year-old car and you go to buy a new car and you are asked to pay a delta for an electrified product, then you are looking

at what you are getting in terms of the replacement and it is a pretty good——

Mr. SHIMKUS. The gentlelady's time has expired.

Ms. MATSUI. Thank you, Mr. Chairman.

Mr. SHIMKUS. The chair now recognizes the gentleman from Georgia, Mr. Carter, for 5 minutes.

Mr. CARTER. Thank you, Mr. Chairman, and thank all of you for being here, very interesting subject.

Mr. BAINWOL. I will start with you. We were just talking about California and their initiatives with the zero emission vehicles and what they are trying to do with that program. It has got to have an impact on your marketing and on your manufacturers and exactly what they are trying to put out there for consumers. What are the challenges that you see there?

Mr. BAINWOL. So California does have a zero emission vehicle mandate that is rising to as much as 15 percent by 2025, and a bunch of other states follow that mandate and it is a challenge. When there is asymmetry between the market and policy it produces cost and so we are working very hard to drive down costs and to build range and to make it more attractive so compliance is facilitated, but it is a challenge.

Mr. CARTER. What about the hybrids? Is that something that has helped ease the transition, if you will?

Mr. BAINWOL. Hybrids help ease the transition certainly for the CAFE and GHG programs, but at this point not for the ZEV programs.

Mr. CARTER. OK. Mr. Remley, I wanted to ask you, through the advent of all this all of a sudden now we have a new anxiety, range anxiety. People are, instead of being concerned about running out of gas they are concerned about running out of electricity. Now this is a concern particularly in a rural area like South Georgia that I represent. I don't see a whole lot of charging stations in the areas that I represent. What kind of challenge is this going to present for your industry and how do you plan to respond to this?

Mr. REMLEY. So, Congressman, thank you for the question. We are looking for the opportunity to participate in the EV rollout. What we are looking for is a free competitive marketplace to do that. As I said, my company and I know plenty others are looking to install EV charging at the various different levels, whether it is Level 1, Level 2 or DCFC fast charging. It certainly is that rollout and the infrastructure needs that are going to be required is a significant investment that is going to need to be made in the country over the years.

I would also like to point out that the current structure which is both tax incentives and energy charges through the entire rate base to subsidize a very small selection of consumers for purchasing these vehicles seems regressive. And so as I said, from the SIGMA NACS standpoint we are looking for a level playing field so that we can deploy free market capital into this exciting new area.

Mr. CARTER. I see this as somewhat comparable, if you will, to what we are trying to do with telecommunications. I suspect in the rural areas we are going to be the last ones to see this type of technology and that is going to penalize us in a sense. What is it going

to take? Are we going to be looking at subsidies or incentives for you to be able to supply those areas with that?

Mr. REMLEY. I think that is an important policy consideration about how rural areas of America will be allowed to participate in this. As I said, we are looking if there are subsidies or if there is going to be government support that that is given to every stakeholder that is currently involved in fueling the motoring public. We firmly believe over decades of experience that our industry has the best corners and the best locations to fuel the motoring public and we are merely just looking to participate in that fueling and that change on a level playing field.

Mr. CARTER. OK. Ms. McKernan, let me ask you. You are consumers. You are the people who belong to your organization, what are their concerns? Is it price? Is it range anxiety? What are the people out there mainly concerned about? Is it just that it is something new that they aren't familiar with or?

Ms. MCKERNAN. Well, I think actually it is probably a combination of everything that you just mentioned. Range anxiety definitely plays a role, but for some people EVs may fit into their lifestyle if they don't have as far to drive. It could be that they have a multiple car household. Most households do have more than one vehicle. Learning about the technology, and that is why it is so important for us to provide the information for consumers and our members is because we think the more that they learn about the technology and that they have a wide range of choices when buying these vehicles that the adoption of this will—

Mr. CARTER. I am not trying to be funny, I am serious. Are you all going to have electric rescue vehicles? When somebody runs out of electricity are you going to send them—they call AAA and they come and they can plug into your little vehicle there and recharge and then take off again?

Ms. MCKERNAN. We actually have piloted a little bit with some vehicles that go out and can charge electric vehicles. But yes, I mean AAA will move as the technology continues to grow so that we can continue to serve our members.

Mr. CARTER. Wow, this is fascinating. Thank all of you for being here, I appreciate it. Thank you, Mr. Chairman, I yield back.

Mr. SHIMKUS. The gentleman yields back his time. And again the chair does thank you all for being here. And seeing that there are no further members wishing to ask questions for this panel, I would like to thank all of you. Before we conclude I would like to ask for unanimous consent to submit the following documents for the record: An op-ed article by a guy named Mitch Bainwol and a letter from Growth Energy. Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Mr. SHIMKUS. In pursuant to committee rules, I remind members that they have 10 business days to submit additional questions for the record and I ask that witnesses submit their response within 10 business days upon receipt of the questions. And I think I have one I want to send, so please do that. Without objection, this subcommittee is adjourned.

[Whereupon, at 12:04 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

PREPARED STATEMENT OF HON. GREG WALDEN

I would like to thank Mr. Shimkus for his ongoing and comprehensive review of fuels and vehicles policy. There is a lot of ground to cover, but we are learning a lot about where we are and what we need to do in order to ensure affordable and reliable transportation for the American people.

Our goal is to take full advantage of any emerging opportunities that come with the growth of electric vehicles, or EVs, in the years ahead, while heading off any potential problems. And today, we will explore how EVs fit into the personal transportation picture. I thank our witnesses, including Dylan Remley of Global Partners, which has operations in my home state of Oregon.

I will say at the outset that I echo Mr. Shimkus' concerns about the viability of EVs in rural America. The range of today's EVs wouldn't get you even halfway across my district, and the electrification revolution has yet to make a real impact on the larger work vehicles that many of my constituents need and use on a regular basis. So, there is a lot more that needs to happen before EVs can work for everyone.

That said, EVs are slowly but surely addressing their shortcomings. Sticker prices are still too high but are coming down, range is still too short but is increasing, and charging times are still too long but are improving.

At the same time EVs are ramping up, refiners and automakers are actively pursuing ways to improve the conventional internal combustion engine in order to remain competitive.

This kind of competition, not just between car companies but also between car types, is good for consumers. Indeed, over the last twenty years, we have essentially gone from the internal combustion engine as the only choice for new car buyers, to a world where hybrids, plug-in hybrids, and all-electric vehicles are also available and come in many models.

I drive a hybrid on both coasts because it's what works best for me. Others may stick with conventional cars, while a small but growing number are choosing EVs and plug-ins. But consumers win when there are a number of cost-effective options to choose from.

As the vehicle mix changes, it is incumbent for Congress to revisit past policies and make sure they are up-to-date. Is CAFE working as intended? Does the Renewable Fuel Standard need an update? Should high octane fuels and vehicles be given a chance? Can the nation's electric grid handle the load? Is refueling infrastructure policy working?

These and other questions will be addressed by today's diverse panel and I thank them for their participation and yield the balance of my time.

<https://morningconsult.com/opinions/automakers-addressing-climate-change/>

Automakers Are Addressing Climate Change

BY MITCH BAINWOL APRIL 24, 2018

Here's something you may not know about automakers: Carbon reductions by our sector already approach the Paris Climate Accord goals for 2025.

Automakers may well have done more than any other industry sector to reduce carbon emissions, because we believe climate change is real, and we have a responsibility to reduce greenhouse gases.

The companies that I represent are investing substantially in advanced technologies, including electric vehicles and fuel cells. Automakers spend more than \$100 billion globally each year on research and development.

In the United States, fleetwide automobile carbon dioxide reductions are already more than 21 percent lower than in 2005.

According to the 2017 Environmental Protection Agency Trends Report, the real-world emissions of new cars and light trucks went from an average of 447 grams of CO₂ per mile (g/mi) in 2005 to a projected 352 g/mi in 2017. And this 21 percent figure does not include carbon reductions made during the manufacturing process in our facilities.

Under the Paris Climate Accord, the Obama administration agreed that by 2025, the U.S. would cut greenhouse emissions by 26-28 percent compared to 2005

levels. So by 2017, automakers were already approaching the percentage reduction that the Obama administration wanted to achieve by 2025.

Automakers are on track to virtually eliminate smog-forming emissions from passenger vehicles in the next decade – and we are achieving this even though there are more cars on our roads today and people traveling more miles. By 2030, passenger cars will contribute only about 1 percent of ozone emissions from all sources of smog, based on EPA modelling data.

But these achievements have been lost in the current discussion around fuel economy standards under review by the National Highway Traffic Safety Administration and the EPA.

Early in President Barack Obama's first term in office, automakers agreed to establish long-term fuel economy targets stretching out to 2025. This bold plan, requiring massive investment by automakers to achieve a social goal we embraced – addressing climate change – came with the agreement to conduct a midterm review halfway through the timeframe (2018) to check government predictions against reality and use that information to set standards for 2022-25.

No factor is more relevant than gas prices, which remain much lower than projected by the government in 2012. With gas at \$3.72 per gallon then, the government expected it to stay high – \$3.63 per gallon – five years later. In reality, in December 2017, gas prices were one-third less than predicted, or \$2.48 a gallon.

As a result, automakers are seeing lower sales of electric vehicles than anticipated. This leads to a gap between estimated targets for 2025 and what

consumers are buying. Using the midterm review as a guide, the NHTSA and the EPA will soon propose a joint approach to fuel economy and greenhouse gas standards and invite public comments from a wide cross-section of stakeholders, including the state of California.

Automakers are committed to increasing fuel economy requirements while also reducing carbon emissions. The key to achieving higher standards is selling more of the record number of highly fuel-efficient vehicles now in dealer showrooms, including more than 50 models of electric cars.

Consumer research shows that the monthly payment is the top concern when car shopping. So the wisest course of action is to keep new vehicles affordable so more consumers can replace an older car with a new vehicle that uses much less fuel, produces fewer carbon emissions and offers more safety features.

Automakers continue to develop safety features and other innovations, and we want to get these technologies – and all their benefits – on the road as soon as possible.

We urge the administration and California to work together to both increase fuel economy standards and keep new vehicles affordable to more Americans.

Mitch Bainwol is president and CEO of the Alliance of Automobile Manufacturers, the leading trade association representing automakers selling new vehicles in the United States.



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GrowthEnergy.org

May 8, 2018

Representative John Shimkus
 Chairman
 Subcommittee on the Environment
 2125 Rayburn House Office Building
 Washington, DC 20515

Representative Paul Tonko
 Ranking Member
 Subcommittee on the Environment
 2127 Rayburn House Office Building
 Washington, DC 20515

Dear Chairman Shimkus and Ranking Member Tonko:

Thank you for this important opportunity to make our views known for today's hearing on the policy implications of conventional and electric vehicles. We appreciate you holding this hearing and are happy to provide comments on this topic.

Growth Energy is the leading association of the biofuels industry representing 91 producers, 72 associated industry partners, and tens of thousands of biofuel supporters. Our members are committed to ensuring a future with a prominent place for renewable fuels, which help Americans save money at the pump, provide a cleaner future for our environment, and improve the livelihood of rural America. Ethanol is a ready-made fuel that provides a myriad of benefits to the American public. Ethanol is renewable, high in octane, reduces greenhouse gas emissions, and provides significant reductions in harmful tailpipe emissions like carbon monoxide and particulate matter.

Today, ethanol is blended in nearly every gallon of gasoline used throughout the country representing 97% of fuel used today, and our producers are poised to do provide more benefit to American drivers. With approval in place for E15 for all 2001 and newer vehicles, the fuel can now be used in 9 out of 10 vehicles on the road today with consumers saving 3 to 10 cents with each gallon and gaining another point in octane. And, as automakers look toward future vehicles to make more fuel efficient engines, they can take advantage of ethanol's substantial octane boost using a high octane, midlevel ethanol blend like E25 or E30 to optimize their engines.

Unfortunately, we still lack the ability to sell E15 year around to motorists across the country. Thanks to a 28 year old oversight in federal law, fuel retailers in conventional fuel areas cannot sell E15 during the summer to the same customers they serve the rest of the year without risking a \$37,500 per day fine. The same provision that was designed 28 years ago to drive ethanol growth and demand is now being used to stifle and stagnate market opportunities for our product. We encourage the Committee, Congress, or the Trump Administration to move forward with a way to fix this important problem.

We also strongly support the Renewable Fuel Standard (RFS), the 10 year old law that provides key market access for America's biofuels producers. By any objective measure of the policy, it has been wildly successful. It has diversified America's energy mix, making our nation less dependent on foreign energy. It has revitalized rural America, helping drive farm income growth and build an entire new American manufacturing industry. It has improved our environment, with a recent USDA study confirming that ethanol reduces greenhouse gas emissions by 43 percent compared to gasoline. It saves consumers at the pump, with standard 10 percent ethanol fuel (E10) saving consumers as much as 50 cents or more over non-ethanol fuel, and 3 to 10 cents when using E15 instead of E10. These are real, concrete successes, ones that can easily go away with poor administration by the EPA or misguided reform efforts in Congress.

We are happy to participate in a discussion of these issues, and look forward to the Committee's examination here today. Should you have any questions or need any further information, I would be happy to provide additional information.

Sincerely,



Emily Skor, CEO
Growth Energy

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS
Congress of the United States
House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

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May 23, 2018

Mr. Dylan K. Remley
Senior Vice President, Terminal Operations
Global Partners LP
800 South Street; Suite 500
Waltham, MA 02454

Dear Mr. Remley:

Thank you for appearing before the Subcommittee on Environment on May 8, 2018, to testify at the hearing entitled "Sharing the Road: Policy Implications of Electric and Conventional Vehicles in the Years Ahead."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, June 6, 2018. Your responses should be mailed to Kelly Collins, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to kelly.collins@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,



John Shimkus
Chairman
Subcommittee on Environment

cc: The Honorable Paul Tonko, Ranking Member, Subcommittee on Environment
Attachment

Answers to Question for the Record

Following a Hearing Conducted by the House Energy and Commerce Committee,
 Subcommittee on Environment,
 “Sharing the Road: Policy Implications of Electric and
 Conventional Vehicles in the Years Ahead”

Question: *Mr. Remley could you please provide the Subcommittee with additional information regarding the issues that may arise with a transition to wide-spread EV adoption?*

Answer: As the Committee continues to look at the future of electric vehicles (EVs), it is important to consider whether policy actions are advancing the goals we have set: namely, an attempt to address climate change concerns and reduce carbon emissions. While these goals are important to pursue, to date policymakers have not considered the profile of the emissions created through increases in electricity generation needed to power EVs. A recent report from the Manhattan Institute, in fact, found that widespread adoption of EVs will “increase overall emissions of sulfur dioxide, oxides of nitrogen, and particulates, compared with the same number of new internal combustion engines.” The report goes on to state, “The simple fact is that, because of stringent emissions standards and low-sulfur gasoline, new gasoline-powered cars and trucks today emit very little pollution, and they will emit even less in the future.”¹ Before we spend significant time and resources promoting EVs, we ought to be sure that they will help fix the issues we are aiming to address. There has not been enough study of these issues to make us confident in the answer to that question.

Furthermore, as we examine more wide-spread EV adoption, it is important to note the challenges posed by increasing use of these vehicles. In addition to the issues presented in my written testimony, further problems that may arise with regard to wide-spread EV use include the capacity strain they may put on electric grids and the potential energy independence and security issues that could arise from promoting use of EVs as a primary form of transportation to the exclusion of other types of automobiles.

The U.S. electric grid is an enormous and complex system—with more than 7,700 power plants and 5.5 million miles of local distribution lines—that delivers power to about 135 million Americans.² The grid, however, is not an endless reservoir of power; the energy it provides is generally capable of meeting current usage levels, but grids can be disrupted. For example, a recent analysis from the Institute for Energy Research noted that in Texas, the simultaneous charging of just 60,000 EVs at the wrong time could threaten the state’s grid. While 60,000 EVs may seem like a lot, Texas registers about 24 million vehicles annually, so that number represents merely one quarter of one percent of all registrations in a year. As such, it is feasible

¹ Jonathan A. Lesser, *Short Circuit: The High Cost of Electric Vehicle Subsidies*, Manhattan Institute (May 15, 2018), available at <https://www.manhattan-institute.org/html/short-circuit-high-cost-electric-vehicle-subsidies-11241.html>

² Department of Energy. (2017). *Valuation of Energy Security for the United States*. Washington, DC: DOE. Retrieved from https://www.energy.gov/sites/prod/files/2017/01/f34/Valuation%20of%20Energy%20Security%20for%20the%20United%20States%20%28Full%20Report%29_1.pdf [hereinafter Valuation Report]

that there could easily be 60,000 or more owners of EVs in Texas, and if enough of them look to charge at overlapping times, they could disrupt the grid.³

The Department of Energy (DOE) notes that EVs might impact the grid in several other ways, most notably, “reduction in transformer life expectancy, accelerated wear and tear of feeder networks, power quality considerations, and capacity upgrades at the substation level to handle the incremental charging demand.”⁴ DOE also reports that, “Unlike the stationary loads on the grid today, [EVs] are mobile loads able to appear at any charging point, adding complexity to the modeling of the grid and load forecasting.”⁵ This can be an issue because depending on the model, “the load from one electric vehicle model can be as much as 19 kilowatts, which is more than the load for most large, single-family homes.”⁶ Grids may not be prepared to handle this kind of power demand, particularly at unexpected or peak times.

In addition to the challenges that EVs pose to the grid, there is also a danger of over-relying on electricity. We have seen in recent natural disasters that electricity can be out for extended periods of time over large geographic areas. For example, according to the Energy Information Administration, during Hurricane Irma last year, more than 60 percent of Florida had power outages for more than a day and outages in some areas lasted more than a week.⁷ Those types of events could make it impossible for people to escape disasters if we do not consider the role of other transportation fuels.

Some of these same considerations may come into play in the event of a cyber attack. It is critical to the U.S.’s continued energy independence and security that we are able to compensate for any losses in one form of energy through energy diversification.⁸ As such, while much is made of EVs increasing our energy independence and security by reducing dependence on other sources of energy, focusing on EVs to the exclusion of other types of automobiles runs the risk of making the U.S. overly dependent on electricity instead. This could be dangerous for our continued national security.

³ Study: *Electric Vehicle Charging Could Present Grid Challenges*, Institute for Energy Research (January 3, 2018), <https://www.instituteforenergyresearch.org/analysis/study-electric-vehicle-charging-present-grid-challenges/>

⁴ Department of Energy. (2017). *National Plug-In Electric Vehicle Infrastructure Analysis*. Washington, DC: DOE. Retrieved from https://www.energy.gov/sites/prod/files/2017/09/f36/NationalPlugInElectricVehicleInfrastructureAnalysis_Sept2017.pdf

⁵ Robert L. Graham, Julieta Francis, and Richard J. Bogacz. (2017). *Challenges and Opportunities of Grid Modernization and Electric Transportation*. (Report No. DOE/EE-1473). Retrieved from https://www.energy.gov/sites/prod/files/2017/06/f34/Challenges_and_Opportunities_of_Grid_Modernization_and_Electric_Transportation.pdf

⁶ Department of Energy. (2014). *Evaluating Electric Vehicle Charging Impacts and Customer Charging Behaviors – Experiences from Six Smart Grid Investment Grant Projects*. Washington, DC: DOE. Retrieved from <https://www.energy.gov/sites/prod/files/2014/12/f19/SGIG-EvaluatingEVcharging-Dec2014.pdf>

⁷ *Hurricane Irma cut power to nearly two-thirds of Florida’s electricity customers*, EIA (September 20, 2017), Available at <https://www.eia.gov/todayinenergy/detail.php?id=32992>

⁸ In fact, DOE lists “diversification of energy fuels, sources and routes” as a main principle of energy security. See *supra* note 2, Valuation Report